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# THE DENTAL COSMOS

A MONTHLY RECORD  
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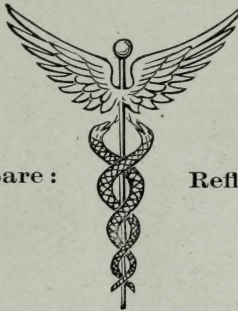
Devoted to the Interests of the Profession

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Observe : Compare :

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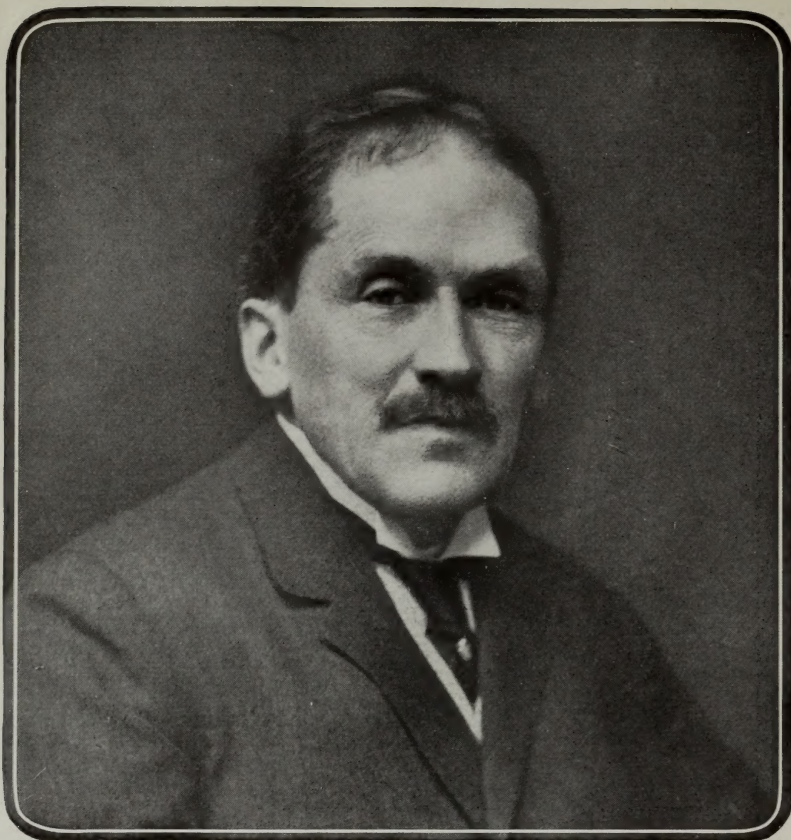
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*E. T. Darby*

THE name of EDWIN T. DARBY, D.D.S., M.D., LL.D., the contributor of the accompanying historical review of Operative Dentistry, has for nearly a half century been inseparably associated with the progress and advancement in operative dentistry. He has been for many decades prominently known in the profession for his resourcefulness and ingenuity in all phases of operative dentistry and his exceptional skill as an expert gold operator.

Though so well known as a skilful operator, Dr. Darby probably is better known to the profession generally as a teacher. His natural aptitude for teaching was early recognized by his associates. In 1865 he began his teaching career as Demonstrator of Operative Dentistry in the Pennsylvania College of Dental Surgery, and with the organization of the Dental Department of the University of Pennsylvania he was called to the chair of Operative Dentistry, which position he admirably filled for forty years, being retired and elected Emeritus Professor in 1917. Dr. Darby has been the recipient of almost every honor within the gift of the profession which, in turn, he has highly honored throughout his entire career.

# THE DENTAL COSMOS

VOL. LXII.

JANUARY 1920.

No. 1

## ORIGINAL COMMUNICATIONS

### Operative Dentistry :

#### Its Evolutional Development During the Past Sixty Years.

By EDWIN T. DARBY, LL.D., M.D., D.D.S., Philadelphia, Pa.

THE changes which have taken place in the practice of operative dentistry during the past sixty years are so great and important that one may well pause for a moment to consider them in detail. Dental practice in 1860 was not divided into specialties, but the dentist of that day was expected to perform all branches of the art as it was then known. He removed superficial caries with the file; he filled teeth with gold and tin foil and occasionally with amalgam, but the amalgam was poor in quality and often consisted of coin silver filings and mercury. Some dentists were in the habit of making their own amalgam after the formula of Dr. Elisha Townsend, which consisted of four parts silver and five parts tin. The only other filling materials that were available at that time were Wood's fusible metal, and Hill's and Bevin's stopping. The oxychlorid of zinc was being talked about and perhaps tried occasionally by a few, but was not regarded as a material of much promise for the filling of teeth.

Many dentists of that day were still filling teeth with non-cohesive foil and smooth points, notwithstanding the fact that five years previously Dr. Robert Arthur had described his method of rendering soft gold cohesive by annealing it in the flame of a spirit lamp.

In 1861, Dr. W. H. Atkinson began using the hand mallet for packing cohesive foil fillings. He did not claim to have been the originator of this method but gave the credit to Dr. E. Merritt of Pittsburgh, who recommended it as far back as 1838 for condensing the surface of the gold in "crown" fillings. The methods of keeping cavities dry at that time were confined to the use of cotton, "spunk" and napkins, and in large operations where much time was required for packing the gold great difficulties were experienced.

It was not until 1864 that Dr. S. C. Barnum suggested the rubber dam for this purpose and it was almost immediately adopted, and has proved one of the most useful adjuncts in dental prac-



tice. There was at first much difficulty in its use because for a time there were no rubber-dam clamps and the ingenuity of the dentist was greatly taxed to keep the dam upon the tooth. Necessity has ever been the mother of invention; the necessity was felt and a great variety of clamps and other appliances were forthcoming.

The crowning of the roots of teeth in the early sixties was confined almost entirely to the so-called pivot or dowel teeth, which consisted of a dowel of hickory wood and the crown of a sound, natural tooth or a porcelain one with a hole in its base corresponding in size to the wooden dowel. A modification of this was sometimes made use of by reinforcing the wooden dowel with a gold wire which was inserted in the wood. Those who were familiar with this operation will long remember the fetid and disgusting odor which was usually present when one of these wooden dowels needed renewal. It is only when we compare that primitive method of engrafting a crown upon a natural root with our modern and beautiful methods of crowning, that one can realize what wonderful progress has been made in this one field of practice. It was only with the advent of oxychlorid of zinc, oxyphosphate of zinc and the silicate cement that modern methods were possible.

#### AMALGAM AS A FILLING MATERIAL.

Another great advance in operative dentistry was made when dentists of scientific ability made experiments with the view of improving the character of dental amalgams. The profession is indebted to such men as Hitchcock, Bogue, Flagg, Fletcher, Tomes, both father and son, Black and others for the improved alloys now in use; nor does this list include some manufacturers of dental supplies, who, knowing the needs of the profession, have employed men of scientific attainments who have greatly aided in the production of amalgams, uniform in formula and scientifically correct.

Perhaps there is nothing, however, that has yielded greater satisfaction and

comfort to the operative dentist than the mechanical inventions. Prior to 1860, there were none of great merit. The jeweler's "bow-drill," as suggested by Josiah Flagg, found but little favor, as its use was restricted almost wholly to cavities on occlusal surfaces of upper teeth. The Spencer drill, introduced in 1849, was seldom used. The J. D. Chevalier drill of 1850 was perhaps as novel in construction as any of those which preceded it, being a small crank and bevel gear, the working tool being applied at an angle of forty-five degrees. Following these were Alfred's, Dubb's, Lewis', Thackston's and Merry's drills. It was not until 1868 that G. F. Green, a pattern-maker of Kalamazoo, Mich., introduced his pneumatic engine which found favor with many dentists, especially in some of the western states.

#### INTRODUCTION OF THE DENTAL ENGINE.

It was not until 1870-71 that the first really practical dental engine, which was propelled by foot power, was introduced. This was known as the Morrison engine and was said to have been a modification of the horse-clipping and sheep-shearing machine. It was such an improvement upon anything that had preceded it that the demand for it from the first was greater than the manufacturers could supply. Imperfect as it was in some of its details, it was looked upon as a godsend to the dentist. The Morrison was soon followed by the Bonwill engine, first, second and third. Then came the Elliott Suspension Engine, the Green Electric, The S. S. White foot engine and, finally, the Doriot engine. Great improvements have been made in many of these. The pedal or foot engine has been largely superseded by the electric motor-driven engine, until today the mechanical appliances used for the preparation of cavities, the finishing of fillings, and all operations which require revolving tools, are so complete that one who has but recently entered the profession has no conception of their advantages as compared to former hand methods.

Almost coincident with the introduction of drilling machines came the automatic mallets for packing gold. Before the rubber dam was introduced, the dentist needed both hands free, one for holding the napkins, the other for holding the plugger, hence an assistant was required to do the malleting. With a view to doing away with the assistant, men of ingenuity solved the problem by introducing the automatic mallet. The first of these came about 1866 and were in about the following order: Foote's, Taylor's, Horn's, Salmon's, Snow and Lewis' and Baxter and Pomeroy's. These were all spring instruments. Then came the pneumatic devices of Bannister, Green, and Gaylord and later the electro-magnetic mallets of Green, Bonwill, Jack, and Webb and, finally, the so-called mechanical mallet of Bonwill, and others of lesser note.

The mechanical appliances thus enumerated have made possible the beautiful operations which have been done during the past fifty years. Without the rubber dam, the dental engine and the manifold accessories which have come with it—the various devices for packing cohesive gold, the work of Royal W. Varney, Marshall H. Webb and a score of others would have been impossible. And this leads me to consider another important period in the history of operative dentistry. It was the time when the controversy of "flat" fillings versus "contour" fillings was engaging the attention of the profession. This began about 1865 and reached its climax about 1876. It will be remembered that the literature of the profession at about this period was rife with articles by advocates of both methods. The restoration of the shape of the natural teeth by the means of cohesive foil found an increasing number of advocates, whereas the dentists who had been in the habit of using the file freely were as strenuous in advocating the flat filling. The file when properly used had saved many teeth, especially where the caries was superficial, and small cavities properly filled with soft or non-cohesive foil were lasting, but these permanent separations

were the cause of much distress to the patient because of the impaction of food upon the gums, and, furthermore, teeth thus separated not infrequently underwent torsion and the filed surfaces came together. The result was recurrence of caries.

When these facts penetrated the dental mind and the facilities for restoring the contour of lost surfaces were at hand, the dentists of high ideals were quick to vie with each other in the excellence of their operations. A high degree of skill has been developed in the profession since the importance of the restoration of approximal surfaces with cohesive foil came to be considered the correct method of treating such surfaces. Nevertheless the number of men who excelled in this work was comparatively small. Since the introduction of the cast gold inlay suggested by Taggart, it has become one of the popular methods of contouring these surfaces. Much laborious effort has been saved and in the hands of those skilled in its use as good or better results are obtained.

#### GLASS AND PORCELAIN INLAYS.

Another innovation in the field of operative dentistry was the introduction of the glass inlay by Timme and the porcelain inlay by Dr. N. S. Jenkins. Both of these methods found great favor at first, but it was soon discovered that the glass inlay became opaque and often badly discolored and frequently disintegrated and its use was soon discontinued. The porcelain inlays as introduced by Dr. Jenkins were much better, and the high-fusing body which approaches the fusing point of porcelain teeth has found greater favor. These so-called cast porcelain fillings seemed to fill a want long felt by the dentist, because it enabled him to fill cavities in the anterior teeth with a material which was harmonious in color and without the laborious effort necessary to pack gold. Valuable as this method has been and is, there are one or two objections which it has been hard to overcome. The first is the change of shade when an opaque cement is used



in setting the inlay and the other objection is the danger that the cement will wash out and the inlay fail. "No chain is stronger than its weakest link," and no inlay whether it be porcelain or gold is better or more lasting than the cement which holds it in place. If, however, the dentist watches his inlays with this weakness constantly before him and recements them upon the slightest indication of failure, he will have good reason to be grateful to the men who invented both the porcelain and gold inlays.

Another improvement has been added to our list of filling materials in the so-called silicate cements. These have been introduced under various trade names and are of variable value as well as lasting qualities. They possess some superior qualities over the oxyphosphate of zinc cement in that they are of greater translucency and most of them more lasting in the fluids of the mouth. Most beautiful effects can be gotten by their use in the anterior teeth, and if used with the care which should attend their employment they last moderately well. The places best suited to their use are small cavities on proximal surfaces of the six anterior teeth and on labial surfaces where fillings of gold would be most unsightly. It must be remembered, however, that where such fillings impinge upon the gum there is danger of disintegration of the filling. Such fillings should be carefully watched.

#### THE DENTAL PULP AND ITS TREATMENT.

In 1860 there were but few dentists who attempted either the conservative or radical treatment of the pulp. There was not to be found in any dental depot of the country a set of instruments for the preparation and filling of the canals in the roots of teeth. Dentists who did devitalize pulps were in the habit of annealing the five-sided broaches of the watch-maker and barbing them with the blade of a pocket knife or an enamel chisel, and extirpating the pulp as best they could with this broach. The instruments used for filling the canals

were also home-made and often so large that it was impossible to carry the material to the end of the root. Gold was the material most used for this purpose, and it was the exception and not the rule to find a canal well filled. One who had occasion to open a tooth thus filled in the early sixties will remember the disagreeable odor which was always present. Canals were seldom well cleansed and almost never properly filled. It was not until Houghton's "Os Artificial" or Smith's "Osteo dentine" (preparations of the oxychlorid of zinc) came into use and canals were filled with it that anything like a clean and odorless canal was found.

Pulps were often devitalized by the means of arsenous acid, and in the single-rooted teeth an effort was made to remove the contents of the canal, but in the double- and triple-rooted teeth the removal of the pulp-chamber contents was about all that was attempted. The tooth was filled and if pain ensued a "tap" opening was made at the gum line and relief obtained. The conservative treatment of the pulp by capping with lead, gold, goose quill and other substances usually resulted in failure, and it was not until the oxychlorid of zinc had been some years before the profession that its use was recommended for capping the pulp. Recent exposures or those made in the act of excavating were the ones which were usually attended with success in capping.

No greater advance has been made in any line of practice since the early sixties than in the preparation and filling of the roots of teeth. The results achieved could never have been accomplished but for the improvement in the instruments for this purpose. Manufacturers have done much to aid the dentist in his work. One after another broaches, drills, reamers, canal pluggers, etc., have been produced, the workmanship and temper of which have been really wonderful and without which no satisfactory work would be possible today. Nor is this all; the manufacturers have prepared for canal filling all manner of materials in convenient form for im-

mediate use and *materia medica* has furnished such drugs as were needed in this work. In 1860, creasote, camphor, iodine, aconite, morphia, oil of cloves, arsenic and tannic acid were about the only drugs used by the dentist. Carbolic acid had just been introduced into dental practice and was used most sparingly. "Oil of Smoke" or creasote was the drug most frequently used. It was the remedy for pulpitis, pericementitis and was used in connection with arsenous acid and morphia for devitalizing the pulp. All dental offices smelled of it and continued to smell of it until iodoform drove out the odor by making a worse one.

In 1860 and for many years after there were no remedies for hypersensitive dentin. If teeth were sensitive when being prepared for the filling, the patient would have to grin and bear it. The ordeal was looked forward to with great dread and with children it was little better than death. Nor was the patient the only one who suffered. The dentist who had any sympathy in his heart suffered also, but it became a question of conscience or faulty preparation of the cavity. To do the right thing caused pain; to do poorly caused failure, and good dentists preferred the former. When the rubber dam came into general use and absolute dryness of the cavity was made possible, it was found that by using a few simple remedies like oil of cloves, carbolic acid, zinc chlorid and later caustic potash and carbolic acid combined, much of the pain incident to excavating could be avoided. There were dentists in that day who resorted to the

dangerous drug arsenic, and as a result it was a common occurrence to see teeth with very small cavities, devitalized and discolored. No matter how minute the quantity employed, death of the pulp was invariably the rule.

Since nitrous oxid and oxygen have come into quite general use and are employed for obtunding pain during the preparation of cavities for filling, much of the dread of the dentist has disappeared. The same may be said of conduction anesthesia. The modern dentist does not consider that he is up-to-date if he does not use novocain in all instances where much pain is anticipated by the patient.

In the early part of this article allusion was made to the only method of crowning in the early sixties, namely, the wooden dowel crown. The gold shell crown was unknown at that time and would have been useless, as there were no cements with which to set it. The oxychlorid of zinc had but just been talked about in dental practice and its lasting qualities were so poor that it was unfit for cementing crowns in place. It was not until the oxyphosphate of zinc came into use that the shell crown became common or useful. The same may be said of all the methods of crowning except in such instances as when gutta-percha was employed to set the dowel in the root. Deprive the dentist of the various zinc phosphate cements or the so-called silicate cements, and the various methods which are attended with beautiful results would be impossible.

1701 LOCUST ST.

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## Prosthesis, Then and Now.

By GEO. H. WILSON, D.D.S., Cleveland, Ohio.

THE decade about 1840 was indeed an epoch-making one in dental history. It was noted for the establishment of the first dental society, journal and college. Porcelain teeth were first manufactured, in this country, in 1820, but the quality was crude. The composition and texture of porcelain was placed upon a scientific basis by Dr. Elias Wildman in 1839; and continuous gum dentures were introduced in 1846 by Dr. John Allen. The first dental law was enacted (in Alabama) in 1841. Nitrous oxid was introduced as an anesthetic in 1842 (Wells), and sulfuric ether (Morton) in 1844. The S. S. White Dental Mfg. Company, the Nestor of dental materials and equipment, was founded in 1844. Plaster of Paris was probably first used for taking impressions in 1840, and in this year Daniel T. Evans patented the first anatomical articulator. Desirabode made use of the term "Prosthesis" in 1847 (Ambler). In 1839 it was estimated there were approximately two hundred (200) worthy practitioners of the Dental Art and twice as many more poorly qualified men engaged in its practice; while now there are approximately fifty thousand (50,000) legally qualified dentists in the United States. Surely the ten years from 1838 was an epoch-making period and marked the beginning of the education of, and the equipment for, a beneficent profession. It was probably in this decade that Dr. Chapin A. Harris said:\*

Prosthesis constitutes by far the largest and most difficult part of dentistry, and thus makes it a distinct branch of the art of medicine and gives to it the power to add to health, comfort, and enjoyment of life.

It is quite evident that the fourth decade of the nineteenth century marked the climax of prosthetics, as the most "important part of dentistry;" that with systematic professional education the higher ideal of preserving the natural teeth predominated; and that with the second decade of the twentieth century Preventive Dentistry became the ideal of professional endeavor. However, it is equally evident that the methods of and results from professional practice cannot be corrected by a thought or a stroke of the pen, but must be brought about by patient endeavor. It is remarkable that the trend of dental practice is returning to the usages of seventy-five years ago. This is not a compliment to the profession, but it does denote an honesty of purpose, and augurs well for its future usefulness. It signifies that dental prosthetics is the most important part of the profession for the passing generation, but that if the profession measures up to its full stature the coming generations shall be spared the calamity of artificial dentures, except in rare instances of accidents.

The year 1843 gave to the world an invention that was destined to have a far-reaching influence in many lines of industry. A patent was granted to Charles Goodyear, Sr., of New Haven, Conn., for the process of vulcanizing india rubber, January 30, 1844. March 3, 1855, a patent was granted to Charles Goodyear, Jr., for the process of using vulcanite as a base for artificial dentures. In 1864 and '65 patents were granted to Dr. John A. Cummings of Boston, for vulcanite dentures. These patents were assigned to the Goodyear Co., and were made the basis for issuing licenses to dentists for the "process" of construct-

\* "History of Dental Surgery." Ambler.



*Geo. H. Wilson.*

GEORGE H. WILSON, D.D.S., the writer of the historical review of Prosthetics, has been actively engaged in the practice and teaching of prosthetic dentistry for a period of forty years and has made many valuable contributions to the literature of the subject, his most notable effort being Wilson's "Manual of Dental Prosthetics," which is widely used as a textbook in dental schools and as a reference manual for dentists. His unusual pedagogical ability and intimate knowledge of prosthesis eminently qualified him for the Professorship in the Western Reserve University, Dental Department, which he held from 1892 to 1918, when he was made Professor Emeritus.

Dr. Wilson's skill as a teacher, his genial personality and pleasing address as a lecturer won for him the admiration and respect of the younger men in the profession in whose welfare he has ever been deeply interested.

Dr. Wilson has received many honors from the dental profession, the most recent being the Jarvie Fellowship Medal of the Dental Society of the State of New York, which is presented each year to the dentist who has contributed most conspicuously to the advancement of the profession.





ing artificial dentures. Dr. Ambler, in the "History of Dental Surgery," says:

These licenses were generally given for one year, and were signed by the licensee, the agent, and Josiah Bacon, Treasurer, who, on account of his arbitrary methods and meanness in dealing with the dental profession, was shot and killed in San Francisco. The contest as to the validity of the patents between the Goodyear Co. and the whole dental profession of the United States was long and bitter. Finally, S. S. White took up the cause of the profession and spent much time and money, and in the end won the case and wiped out the abomination.

Since the status of prosthetics was defined by Professor Harris, it is evident that dental plate prosthetics steadily declined in the estimation of the profession until the last few years. Many regarded this decline as the result of the use of vulcanite. This is a very erroneous idea. There are three reasons for the waning importance of plate prosthetics: *First*, the noble ideal of preserving the natural dental organs; *second*, the ignoble one, that vulcanite did not lend itself, so well as metal, to "selling talk," and *third*, the introduction of crown and bridge work. While plate prosthesis declined in the estimation of the profession the demand for plate dentures did not retrograde, as evidenced by the number of porcelain teeth manufactured. It is recorded that in 1834 about two hundred and fifty thousand (250,000) teeth were manufactured. These were entirely in the form of crowns and metal plate teeth. In 1854, two million (2,000,000) teeth were manufactured. In 1907, twenty million (20,000,000) were produced, and, in 1914, more than sixty million (60,000,000) porcelain teeth were made in the United States. A large majority of these teeth were designed for vulcanite base dentures.

In 1907 a new impetus was given to the importance of plate prosthetics by Dr. J. Leon Williams, an American dentist practicing in London, a gentleman of broad culture and a highly developed artistic temperament, who began a campaign for better artificial tooth forms.

The work of Dr. Williams in conjunction with Dr. Gysi of Zurich resulted in the production of "Trubyte" teeth. However, there was another more powerful influence creating a demand for plate dentures, namely, the subconscious knowledge of the inadequacy of the methods of operative procedure. Dr. Hunter, a medical man of England, made vital this subconsciousness in his famous lecture at the McGill University at Montreal in 1910, where he characterized certain methods of crown and bridge work as "American Septic Dentistry." It is evident that the profession was ripe for such an awakening, for several years before Dr. Hunter had sounded such an alarm, but it fell upon deaf ears. Pathologists and researchers have so developed and impressed upon both the professions, medicine and dentistry, and the laity, the fact that the teeth are fertile foci of infection, until now plate dentures are the only logical restorations for lost dental organs.

#### CROWN AND BRIDGE PROSTHETICS.

In the early seventies, Dr. C. M. Richmond, an Ohio dentist, moved to California and entered upon the practice of his profession. While thus engaged he became acquainted with the Beers patented gold crown, and after the death of Dr. Beers, Dr. Richmond returned East, in 1878, and on his way stopped at several cities and taught the method of making and setting gold crowns to classes of dentists solicited for such instruction. Soon after locating in New York City he formed a partnership with the Sheffields and they opened a large advertising office for the purpose of advertising the gold crowns and the then developing bridge work.

The eighties were very prolific in the development of the crown and bridge, in fact, the prototype of every accepted form of crown and bridge of today had its development, if not its origin, in this decade. It very largely replaced partial plate dentures to such an extent that many of the young men leaving college could not conceive that there was any-



thing in dentistry worth while, but crown and bridge work. By the latter part of the eighties the profession had become so absorbed in the practice of crown and bridge work, that dentistry became a very tempting field for the patent process shark. A few excerpts from Dr. C. R. E. Koch's "History of Dental Surgery" will show the magnitude and importance this work had assumed in the short period of ten years.

In 1889 the Dental Protective Association of the United States was formed and incorporated.

A prospectus was sent to every dentist, which contained the following:

"First: Dentists are writhing throughout the country under having to submit to a grasping monopoly because single-handed and alone they cannot afford the expense of contesting its unjust claims. Numbers are being annoyed and prosecuted for the infringement of patents whose validity has never been established, and there is every reason to believe never can be established if dentists are organized for defense.

"Second: Practitioners have not forgotten the treatment they received at the hands of the Goodyear Dental Vulcanite Co., and from the fact that the International Tooth Crown Company is largely managed by the same individuals they can infer the treatment they may expect if they are unfortunate enough to be left in its power.

"Third: If they do not defend themselves, but allow this Company to prosecute its claims, they will have to pay a royalty on all or any banded or gold crown they have ever made or may make in the future."

The new Association was governed by a Board of Directors consisting of Drs. J. N. Crouse, Truman W. Brophy and E. D. Swain, with Hon. Lyman J. Gage acting as Treasurer. Seven thousand dentists joined this Association, each paying the membership fee of ten dollars (\$10.00), and some of them a later assessment of ten dollars (\$10.00). In 1895 the Association reported that "so far in its history it had won every suit that had been brought against any of its members." It can be said at this date that the Dental Protective Association fought the monstrous International Tooth Crown Company to a conclusion

and never lost a case. That the International Tooth Crown Company was a monstrous evil is substantiated by another excerpt from the fore-named history.

Shortly after this (the successful defense of June 1900), the parties who had been defeated approached Dr. Crouse with the suggestion that a man of his energy and capacity ought to be a millionaire himself, and that they might suggest to him a way by which the road to affluence would be open to him. A request was made upon him for an interview, to take place in a Chicago hotel. During the interview, which was held in the presence of a concealed witness, the proposition was made to Dr. Crouse that he, as chairman of the directors of the association, should permit them to win two or three suits. In consideration of this, that they would place at his disposal, for his own use, a sum double as large as all the dues that had been paid by the members of the association for its support, and that in addition they would place him in a position to receive percentages of all the amounts to be collected in way of royalties from the dental profession. This proposition was promptly declined, and the fight in the interests of the profession continued as loyally as before.

It may be further stated that the International Co. proposed that the members of the Protective Association should not be molested, only the non-members should be at the mercy of the persecuting company. A modern example of temptation by the devil.

It is but just that the closing paragraph of this historical sketch be quoted:

It is no disparity to others to state that the master mind that was ever watchful during the struggle that ensued between the American Dental Protective Association and associated and other efforts against parties who were determined to wring unjust contributions from the members of the dental profession, under the guise of privileges granted by United States patents, was Dr. John N. Crouse. To his pugnacious persistency, loyalty, and ability the dental profession in this country is indebted for its liberation, and for the freedom from similar impositions it now enjoys.

Is it any wonder that many of the older leaders of thought of the dental

profession are uncompromisingly incensed against process patents? May the day soon come, when for a dentist to offer a process license will mean such ostracism that it will spell the offender's professional death!

There never has been any serious objection, in the dental profession, to a patent upon a material entity, for such protection is but just for the manufacturer and creator of the demand for the manufactured article; but for a professional man to exact millions for a thought, when it is a part of the duty of a professional man to teach his professional brother for the benefit of humanity, is despicable. Bridge work has had many declaimers both for and against, but since Hunter gained a hearing the popularity of crown and bridge work has steadily declined. Fixed bridge work is rarely advocated, and only those men of exceptional ability can get the attention of an intelligent audience. The so-called "removable bridge" is now being lauded by the enthusiast for crown and bridge work.

An editor of a dental journal recently wrote as follows:

Dentists dreamed and talked for years of making a dental bridge that could be removed from the mouth, sterilized, polished, and then replaced in a position so that it would give service. The dream has been realized: "removable" bridges are now a fact.

It is well known that foreign substances will attach themselves to a bridge the same as they do to the natural teeth. Such substances are more difficult to remove from the surface of a bridge than they are from the natural teeth and as a consequence a bridge soon becomes very foul and in many instances is a menace to health. These conditions are overcome by the use of the "removable" structures such as are coming into use more and more in modern dentistry.

What a pity that so brilliant and promising a writer should lend his influence to so questionable a method. It is such writings as these that give encouragement to the unprincipled and to the unthinking, and hence easily lead astray members of the profession. It is not the spanning portion of a bridge, the

portion that may be removed, that does the harm; but it is the unnecessary (but necessary for bridge work) cutting of the natural teeth and the fixing of attachments to the teeth by a questionable cement, and often ruthlessly devitalizing pulps for the purpose of setting either form of bridge that produces the reprehensible part of bridge work. The real arguments in favor of removable bridge work are that it does not hold the abutment teeth so rigidly; and that in the past only those of superior technical ability have essayed to practice this most difficult and exacting operation; but—what is in store for the reputation of removable bridges in the hands of those of mediocre judgment and technical skill?

#### PARTIAL PLATE PROSTHETICS.

Seventy-five years ago partial dentures were held in place by either surface contact (molecular attraction) or clasps. Clasps were classified as stay, spring and standard clasps. The stay clasp was adjusted to a natural tooth and was in contact with one side and at two angles. The spring clasp was adjusted to the tooth so that it inclosed two sides and three angles. The standard clasp was either a stay or spring clasp connected to the base with one or two strips of metal (standards).

The spring clasp embodies two physical principles, tension and friction, hence may be classed as the tenso-friction method. The tenso-friction or spring clasp, in some form, is almost exclusively used for retaining partial plate dentures at the present time. All the forms of patent attachments for partial plates or "removable bridges" are some form of the spring clasp; they are either bar and slot, tube and split pin, pin or ball with slit tube, mortise and tenon or telescoping crowns. It does seem that every possible form of device for retaining partial plate dentures has had its advocates. For partial dentures the writer confines his practice to spring clasps adapted to the naked tooth. There are two general methods of forming



clasps, *i.e.*, conforming with pliers and hammer, and casting. Clasps require that the physical properties of toughness, flexibility, and elasticity shall be developed to a high degree in the metal used. These properties are developed by alloying, and to their highest degree by rolling or drawing. The casting method is now (1919) passing through the period of faddism. The method certainly has both its good and bad qualities, and the novice has many lessons to learn.

#### FULL PLATE PROSTHESIS.

Seventy-five years ago metal was almost exclusively used as a base for artificial dentures, but with the advent of vulcanite and similar substances the metal base almost passed out of existence. However, with the introduction of crown and bridge work the metal base denture became more popular, but the number of pieces constructed upon metal bases is inconsiderable as compared with those upon vulcanite.

Vulcanite as a material has been, and is, a great blessing to the profession and laity because of certain physical properties, ease of manipulation, and its inexpensiveness; and it has been and is a curse to the profession and laity because of the same reasons and other inherent qualities of weakness. Vulcanite is not a definite material as is a metal, but it is primarily a compound of caoutchouc gum and sulfur. Caoutchouc gum is not a definite thing, but consists of gums of similar composition and physical properties. There are more than three hundred varieties of trees, shrubs and plants in the Amazon valley alone, that produce a gum with the physical characteristics of caoutchouc. It is hardly possible to know or control what the native gatherers put into the crude material placed upon the market. It is a known fact that the plantation (cultivated and scientifically treated) gum does not have some of the desirable properties of the native (wild) gum. However, the plantation is the more reliable source of production and less expensive to the

manufacturer. Of what the manufacturer's product of rubber is composed is also unknown to the profession and public. This, however, is controllable by law, and it is to be hoped that our public health organizations will soon have laws enacted extending the pure food and drug laws to require that all manufactured compounds that have in any way to do with the health of the public shall have the exact composition printed upon the containers, and that any misrepresentation shall constitute a felony. The dental rubbers should certainly come under such legislation. It is questionable if the profession is producing as high an average grade of vulcanite dentures, as it should with the materials and equipment furnished by the manufacturer. It is the opinion of the writer that the profession is culpable in that it permits such poor quality of vulcanite to be placed in the mouths of the public. This can be very much improved upon by the mass of the profession adopting a better technique of vulcanization and finishing. The profession is much indebted to Dr. Geo. B. Snow and a few others for their efforts in the direction of better vulcanite products by the profession.

#### ANTAGONIZATION AND ANTAGONIZERS.

Probably the study of, and inventions for, antagonization have been the great causes for the progressive development of artificial dentures. This development may be divided into three periods. The first or *Empiric* period, the second or *Bonwill School*, and the third or *New School*.

*The Empiric period* was a necessary antecedent of the schools and included the time up until thought upon this subject was crystallized into expression by Dr. Bonwill in 1864.

*The Bonwill School*: History records that probably J. B. Gariot was the first to devise an implement for occluding artificial teeth. This was about 1805. The slot and pin joint of Daniel T. Evans of Philadelphia was probably the

first of the so-called anatomical antagonizers (articulators); but it was not until Dr. W. G. A. Bonwill of Philadelphia made his invention in 1858 and read his notable paper at the session of the American Dental Association held at Niagara Falls, N. Y., in 1864, that scientific methods for mounting artificial dentures assumed an important place in the developing profession. Because of the amount of research, writing and teaching done by Dr. Bonwill credit can justly be given to him as the Father of Scientific Prosthesis. Undoubtedly the inspiration for all later research and invention in this department of dentistry, had its inception in the work of Dr. Bonwill. Thus to speak of the followers of Dr. Bonwill as the Bonwill School is a just recognition of his work and influence for the development and advancement of plate prosthetics.

The Bonwill School was based upon five fundamental principles: *First*, the mandible as a lever of the third class; *second*, the equilateral triangle; *third*, fixed rotating centers; *fourth*, the dental circle; *fifth*, alignment of the teeth.

There have been many notable teachers developing this school, but probably it reached its highest development with Prof. A. Gysi, of Switzerland. Prof. Gysi especially developed the fact that the rotation center is not on the head of the condyle or base angle of the triangle, but anywhere in a sphere an inch in diameter, back of the base line and about the sagittal plane. This he demonstrated with his condyle path recorder. Unconsciously, probably, he was establishing a principle for a new school. Norman G. Bennett of England added to this principle by demonstrating the lateral mandibular movement with a rotation center about four inches above the base line and in the sagittal plane. About the same time Prof. F. W. Frahm, then of the University of Denver, now of the University of Southern California, demonstrated that rarely were the two sides of the cranium exact counterparts, therefore that the sagittal plane of the cast should be placed in the center of the antagonizer, and the condyles adjusted

thereto. Dr. Frahm thus demonstrated that the mandible is not an equilateral triangle. Dr. Bonwill was led astray on his equilateral triangle because he did not take into account the fact that anthropologists divide crania into two classes, long and narrow heads (dolichocephalic) and short and broad heads (brachycephalic). If Dr. Bonwill had comprehended the Cephalic Index he would not have presented his theory of the equilateral triangle.

In various countries men are doubting the truth of the proposition that "the mandible is a lever of the third class," and are studying the action of the ligaments and muscles of mastication. Strong arguments are found in the parallelogram of forces, which demonstrate that the resultant muscle action throws the entire force upon the bolus of food; and, the logical deduction, that nature does not wantonly waste energy. The temporo-mandibular joint is a ball and socket for balancing purposes; and may and does act as a lever of the second class as well as a lever of the third, but these actions are incidental, not primary. The true function of the mandible is as the moving part of a mill. That the mandible is not a lever of the third class was contended in a paper read at the National Dental Association meeting at New Orleans and will be published in the *National Dental Journal* in due time.

Prof. Gysi carried to the highest development the idea that the movements of the condyle and their reproduction in an instrument were the essential factors in anatomical antagonization. Dr. Rupert E. Hall, a young dentist practicing at Houston, Tex., became convinced that the condyle was not the dominating factor of the movements in mastication, but that the important factors were the cusps and inclined planes of the teeth; that the long movements of the opening mouth and their measurements were non-essential, but that the closing movements of the mouth after contact of a point of a lower tooth with a point of an upper tooth were the essential and controlling factors in anatomical antagonization. He perceived the



fact that as there were but about two millimeters of lateral movement of the teeth and that the movements of the condyle were too small to be measured and withal unimportant from the point of view of artificial denture construction. He also conceived the idea that a forty-five degree angle of the teeth gave the greatest efficiency with the required strength.

Dr. Bonwill recognized the true anatomical relationship of cusps and overlap, that is, that the short cusps were back and that the cusps increased in length forward with a one-third normal overlap of the incisors. Prof. Gysi recognized this same anatomical principle, but for mechanical reasons he reversed the order placing the long cusps back and with a short overlap. Dr. Hall in his scheme returned to the true anatomical formation of the cusps and overlap as recognized and taught by Dr. Bonwill; however, he went further and milled the teeth to reproduce well-worn teeth of the long shut type. This excessive milling gives wonderful results in his hands, but it remains for time to determine its practicality with the mass of the profession.

Dr. Hall, not being satisfied with the instruments upon the market to produce the results he desired, began experiments to develop an instrument that would better serve his purpose. He conceived the idea that Dr. Bonwill's equilateral triangle turned backward would represent the lateral rotation center and upward would represent the vertical center of Bennett. He found that the vertex of the triangle when turned backward rested upon the occipital protuberance, and that a line drawn from this apex to the incisal apex described the occlusal plane of the teeth. As a rotation from two fixed points placed at right angles to each other will have a resultant action, and if a rod connects the two rotation centers and a short sleeve with an arm attached is rotated about this forty-five degree rod, the arm will describe the same resultant arc from any portion of the rod. Therefore, if the maxillary plate of an antagonizer be attached to

the forty-five degree rod, it becomes the fixed or stationary portion of the instrument, and if the mandibular plate be attached to the sleeve it becomes the movable portion. However, for convenience the mandibular plate is held stationary and the maxillary plate is manipulated, but the resultant action is the same. In the Hall instrument the rotation center is in the sagittal plane, above the occlusal plane, and in the Gysi instrument the rotation center is about the sagittal plane, but because of the short movements of the teeth in inlocking, the rotation center must be at the sagittal plane and also above the occlusal plane. It is remarkable that these two instruments should have their rotation centers practically identical. The one confirms the correctness of the other; however, the one is positive proof and the other is negative. The Hall result is arrived at from the positive movements of the teeth, and the Gysi from the negative movements of the condyles.

The Snow Acme antagonizer has its rotation centers so constructed that it is practical. The Snow and Gysi instruments have face-bows for establishing the location of the centers and setting the casts and wax occlusion models in the antagonizer, while the Hall requires no face-bow, but has a jig for mounting the casts and occlusal wax models in the sagittal and occlusal planes, and at the average antero-posterior position. Thus the length of the open and shut of the dentures can be changed at will in both the Snow and Gysi instruments, but not in the Hall if the apex is much off from the average. However, it is assumed in all three of the instruments that properly formed and correct occlusion models are obtained, but it is more essential in the Hall than in the others. Hall provides for and takes care of any slight inaccuracy in the bite by his "corrective bite" and "milling."

Dr. Hall showed his inventions and made a practical clinical demonstration at the 1914 National Dental Association meeting at Rochester, N. Y., which made a marked impression upon those who saw it. Among those interested were

representatives of the S. S. White Dental Mfg. Co. This company secured the services of Dr. Hall to perfect the instrument and place it upon the market. However, for various reasons including the demands of the World War the instrument was not upon the market until 1919.

*The New School.* It is evident to the writer and it should be to all interested in this department of dentistry, that a new school of thought and practice is developing; based upon the research and inventions of Gysi, Bennett, Frahm and Hall. This is evidenced also by the activities of the members of the profession interested in prosthetics. In 1918 a call was made for a gathering, at the Congress Hotel, Chicago, to take place during the meeting of the National Dental Association, of those men known to be interested in Dental Prosthetics. An association was formed, a constitution was tentatively adopted, and a full coterie of officers was elected; of these Dr. W. A. Giffin of Detroit was the president and Dr. Dayton D. Campbell of Kansas City, the secretary. The tentative constitution was ordered printed and sent to those interested. The assembly adjourned to meet the week before the National Dental Association meeting at New Orleans. At this meeting the constitution was discussed, altered and adopted. Dr. M. M. House of Indianapolis was elected president and Dr. Campbell continued as secretary. The program consisted, in part, of the

following papers: President's Address, Dr. W. A. Giffin; Vulcanization, Dr. Geo. B. Snow; Scientific Paper Writing, Dr. C. J. Stansberry; Alveolectomy, Dr. C. P. Ruyl, and a symposium of papers by Drs. J. Leon Williams, Geo. H. Wilson and Rupert E. Hall, on the Temporomandibular Joint. The discussion was opened by Dr. H. J. Prentiss, Professor of Anatomy at the University of Iowa, and Dr. Martin Dewey of the Dewey School of Orthodontia. The association contemplates a study session, of those of its members interested, with expert anatomists and physicists, at the University of Minnesota for August 1920. It is hoped that profitable and practical conclusions will be developed at this proposed study session.

#### CONCLUSION.

Then and now. *Then*—Seventy-five years ago Empirical Plate Prosthetics was the most important part of dentistry. Within this period of time Operative Dentistry for restorative treatment of the teeth became the most important department of dentistry, but is now waning. Also, Crown and Bridge Prosthetics was born, reached its zenith and is now moribund. *Now*—Plate Prosthetics has been restored to its youthful importance, is becoming thoroughly scientific and esthetic; and is second in importance only, in the profession to Preventive Dentistry.

SCHOFIELD BLDG.



## Orthodontia: Its Origin, Evolution, and Culmination as a Specialty.

By MILO HELLMAN, D.D.S., New York, N. Y.

### INTRODUCTION.

**B**EFORE the closing episode of the most horrible chapter written in the annals of human strife, the world was startled by the news, that a propulsive force was perfected by the ingenuity of man that hurled a missile over a distance of seventy-five miles. Stupendous as this achievement appears, it does not rank in significance with the fact that at a certain period in the course of evolution man grasped a stone with his hand which he used as an aid in combat. Thus, by the swing of his arm and the weight of the stone, he was able to dispose of his foes, whether beings like himself or lower animals, who threatened his existence.

The "big gun," though representing an incomputable amount of force concentrated, by a highly developed intellect, in one implement, accomplished little more than to demonstrate the culmination of the stone incident. It furthermore proves the possibilities of the latent energy that resided within the material filling the bony cavity of the skull when the idea of reaching for a stone first entered the mind.

The stone incident, moreover, implied an assurance by nature that man required no horns nor antlers, no claws nor hoofs, no tusks nor fangs to enable him to care for his personal comfort and that of his family. It shows that he is a generalized being, as is well illustrated by the character of his dentition, and that he can adapt himself readily to all conditions of life and cope with all arising emergencies without the

need of any specialized organ other than the intellectually developed brain.

Thus, the fate of man's dental apparatus, for instance, was sealed at the time when he was prompted to resort to the stone as a means of enhancing the shortcomings of his bare hands. Skilful hands and intelligent brain then became the foundation upon which man's future is constructed. But, although physical man has remained fundamentally unchanged, his "wits and his will have enabled him to cross rivers and oceans by rafts and boats," submarines and aircrafts, "to clothe himself against cold, to shelter himself against heat and rain, to prepare an endless variety of food by fire and to increase and multiply, as no other animal, without change of form, without submitting to the terrible axe of selection wielded by ruthless nature over all other living things on this globe." (Lankester.)

The skill of man controlled by his wits and his will, must have originated at very remote times to reach the stage of development before the beginning of history. Moreover, that artistic and mechanical skill was highly developed among the primitive ancestors of man is abundantly proved by their industries. The discoveries of stone implements of the second interglacial period, about 250,000 years ago and the artistic attempts by the Crô-Magnon, discovered in the form of outlines upon rock of animals of those times, dating about 40,000 years back, prove beyond doubt the antiquity of our manual dexterity as well as our artistic proclivity.

Thus, the orthodontist who so grace-



*Milo Hellman*

MILO HELLMAN, D.D.S., after graduation in dentistry, was attracted to the specialty of Orthodontia, and with the other graduates of the Angle School has been largely instrumental in bringing orthodontia to the status it has since attained as a distinct specialty of dentistry.

A born student and researcher, it was only natural that the more profound problems in orthodontia should attract his attention, and as the result of his studies in this field he has contributed to the literature of the subject many valuable communications. His thorough familiarity with the history of the development of orthodontia as a specialty eminently qualifies him to speak with authority on this subject.





fully adjusts the "pin and tube" or "ribbon arch" appliances today, when viewed from this aspect, exhibits a skill less remarkable than did the Etruscans and Phoenicians when they demonstrated their wonderful attainments in mechanical dentistry, thousands of years ago. Moreover, although the primitive orthodontic predecessor had for his armamentarium a file, a wire and a string, his ultra-modern successor, despite his 20th century requirements in equipment, has not progressed far enough to be able to dispense with the utility of these rudimentary tools. It must, therefore, be realized that history, backed as it is by evolution, does not find modern achievement so far advanced as to fail to discover a connecting link between what exists and what has preceded it.

Thus, referring to *orthodontia*, which according to Angle (1907) *has for its object the correction of malocclusion of the teeth*, it must be stated that the discovery of skulls of prehistoric man reveals the fact that malocclusal manifestations existed as far back as the post-glacial period, about 15,000 to 20,000 years ago. Contrary to the contention of many, it may be satisfactorily proved:

1. That occlusal anomalies are conditions not brought on by modern civilization, but that they have been in existence as long as man himself;
2. That although orthodontia is a comparatively recent acquisition, the correction of irregular teeth has been practiced thousands of years ago;
3. That observations based on concomitant effects of irregular teeth and various associated structures have been made long ago; and
4. That many theories and ideas, relative to the causes, still clung to by ultra-modern practitioners are as old as the irregularities of the teeth themselves.

In order, therefore, to convey an adequate idea of the subject in hand in the briefest possible manner it will be necessary to treat it from the aspects of the available historical evidence on:

1. Facial Expression as Influenced by the Teeth;
2. Observations on Occlusion;
3. Causes of Malocclusion;
4. Classification of Malocclusion;
5. Means Employed in Treatment of Malocclusion.

It must, however, be remembered that like the period of a thousand years in evolution, so the lapse of a century in history may be compared to the fleeting hour during a busy day. The high spots, therefore, appearing upon the horizon of recorded human activity, seem like sudden manifestations, when in reality each phenomenon must, in the course of time, have had its inception, development and culmination. It is, then, the *culminating phase* that really is brought to the attention for observation.

#### FACIAL EXPRESSION AS INFLUENCED BY THE TEETH.

"Love of Beauty is practically a universal passion." (Yard.) To this passion, orthodontia owes a debt of gratitude, the magnitude of which can only be gaged in proportion as its truth becomes evident. It is for the satiation of the love of beauty that the opposite sexes from time immemorial have resorted to all sorts of objects and means to adorn their bodies. Moreover, adornment was the only purpose thought of when anatomic parts were concerned, the function of which was not known nor their significance understood. Thus, the skin of our bodies, especially that of the face, has always been used as a background for artistic display of decorative art. The human hair is even today used for decorative purposes, the males utilizing the growth covering the upper lip and the lower jaw; the females, that upon the supra-orbital ridges and scalps. The nails are treated as though they were for ornamental purposes only as are, also to a considerable extent, the teeth of man.

History bears considerable evidence of filing, chiseling, painting and filling of



teeth for esthetic improvement or for ornamentation. Thus, "some Asiatics," according to Arthur Brisbane, "consider a married woman ugly and immodest if she does not paint some of her front teeth black." Even extraction, though recorded to have been performed for religious purposes, as sacrifices to certain deities, carried with it a certain amount of individual distinction. Also in nuptial celebrations, the teeth at times play an important rôle. For instance, in some parts of South America, a married woman must have a "couple" of her front teeth knocked out—the husband doing that as part of the wedding ceremony.

Restoration, on the other hand, of missing anterior dental members was undoubtedly originally intended to regain lost attractiveness. While it was customary of primitive races of long ago, as it is of some uncivilized tribes of today, to mutilate or paint their teeth for decorative purposes, modern civilized man still continues to look upon a well-developed denture as a distinct mark of beauty.

Historical evidence, as uttered by various authorities on this topic, reveals the fact that the representative view of the profession does not materially differ from that of the laity. Thus, the earliest records bearing on teeth manifest a tendency on the part of practitioners to take advantage of the "love of beauty" in emphasizing the importance of regular teeth as an adjunct to good looks. Thus, ADAMANTUS (A. D. 300) contends that not only do the canines contribute to favorable facial expression, but they also influence the character of the individual. PAULUS AEGINETTI (625-690), with an eye for the fair sex, observes that irregular teeth are "displeasing in woman." JOHN HUNTER (1728-93) emphasizes the fact that "esthetic appearance of the mouth is the main reason for orthodontic procedure." While ROBERT WOOFFEN-DALE (1783) is of the opinion that "the teeth are the greatest ornaments of the human face." DELABARRE (1819) reluctantly states that "formerly, these bones (teeth) were regarded, indeed, as mere

ornaments of the face, and consequently their preservation was rather of the province of the perfumer than the regular physician." He, nevertheless, admits that "beautiful arrangement and regularity of the teeth give grace to the physiognomy." PH. E. BLANDIN (1836) takes a more serious aspect of this phase. He dwells at length on the influence of the teeth upon the modification of the face from infancy through youth and adult age to senility.

LEFOULON (1841) puts considerable emphasis upon the effect of irregular teeth on the expression of the face. While KINGSLEY (1858), imbued with the artistic sense of esthetics, argues that it is "most conducive to the beauty of the individual that all the permanent teeth should stand in the arch." Of course, this implies not only the relationship of the teeth to beauty, but also the provision that it is *most conducive to beauty to possess all the permanent teeth*. He thereby raises his voice against the loss of any teeth, probably by extraction, as impairing beauty.

CALVIN S. CASE in his "Facial and Oral Deformities" (1896) believes "that a large proportion of all facial imperfections, which in many instances amount to actual deformities, are due to an inartistic relation of those features whose form and contour are governed by the position of the teeth and the peripheral surface of the bone in which the roots are imbedded."

EDWARD H. ANGLE in his "Malocclusion of the Teeth" (1907) finally sums up the various opinions expressed, in a few clearly stated propositions. Thus: "The mouth is a most potent factor in making or marring the beauty and character of the face, and the form and beauty of the mouth largely depend on the occlusal relations of the teeth." He furthermore contends in order "that our efforts may be intelligently directed toward the ideal, some rule, some principle, must guide us." The rule, worked out after exhaustive studies and careful observations, is "that the best balance, the best harmony, the best proportions of the mouth in its relation to the other

features require that there shall be *the full complement of the teeth, and that each tooth shall be made to occupy its normal position—normal occlusion.*"

#### OBSERVATIONS ON OCCLUSION.

The famous French artist, MEISSONIER, said that "we see only what we know." In few instances could this statement be better illustrated than by the revelation of the significance of the arrangement and interrelationship of the teeth. To the early observers, the alignment of the teeth meant little more than a row of objects. A string of pearls came nearest the semblance of an evenly arranged dental arch. Hence, the expressions "tooth row," "pearly white teeth," or, the teeth of a certain individual look "like two rows of pearls." Moreover, as judgment was passed on those teeth of the dental arch which were exposed to view, it is self-evident that the descriptions mentioned implied only those teeth which were situated in the anterior part of the mouth; namely, the incisors and canines. But even in these narrow limits, the description was often restricted to the teeth in the upper jaw alone.

Thus, when CELSUS (50 A. D.) advises that a misplaced erupting tooth should be "pushed toward its place by means of the finger until it arrives at its just proportions," he has in mind a certain position that will render the misplaced tooth in even alignment with the other teeth. GALEN (131-201) though speaking of the function of the incisors as "capable of cutting or biting," nevertheless, fails to mention the exact manner in which this is accomplished, that is, whether they cut by a shearing or a nipping action.

The description by HUNTER (1728-93) bearing on the treatment of a case of lower protrusion, reveals the fact that his efforts were concentrated upon forcing the lower incisors lingual to the upper. It may consequently be inferred that his conception of the normal relation of the anterior teeth was correct. The same evidence may also be obtained

from the records of JOSEPH FOX (1803).

Not until 1805 was it clearly shown that a positive relation exists not only in teeth adjacent to each other, but also among those antagonizing one another. Thus, it was J. R. DUVAL (1805) who showed a very clear conception of the incisor occlusion in that he states that besides being "properly arranged by the side of each other, those of the upper jaw have a special connection with those of the lower."

This conception gradually assumed larger dimensions, as the observers improved the scope of their knowledge. Thus F. C. KNEISEL (1836), though describing normal occlusion as judged by the interrelationship of the incisors, nevertheless, has an idea that irregularity "occurs in the sixteen front teeth, generally in the upper." Also LEFOULON (1841) is of no other opinion. DESIRABODE (1843), while claiming that the lips on the outside and the tongue on the inside of the mouth constitute a balance of force holding the teeth in position, does not, however, express any view about the relationship of the upper to the lower teeth.

JAMES D. WHITE (1850) gives evidence of a more extensive appreciation of the denture in that he contends that the first permanent molars are "the most valuable in the head." While E. C. ANGELL (1860) voicing the same sentiment adds that the first molars "are the first of the permanent set to take their position in the mouth, and are usually developed and admirably articulated before any of the primary teeth have fallen from their sockets." He attributes to nature the munificent wisdom of providing thereby "a sure and unerring guide, to the correct occlusion of the jaws, despite the loss of the deciduous set."

GEORGE T. BARKER (1862) evinces a conception of occlusion by the method he recommends for treatment of irregularities; namely, by aiming at first to "create a natural articulation of the bicuspids and molars." In a similar manner is manifested the idea of normal occlusion by NORMAN W. KINGSLEY



(1829-1913), namely, by "jumping the bite." By this procedure he demonstrated that protrusion of the upper jaw is not necessarily corrected by elimination of teeth, but rather by a readjustment of the two dental arches bringing all the teeth into their normal relationship.

JOHN HUGH McQUILLEN (1826-79) gives a most adequate description of the manner in which the upper and lower teeth antagonize each other in normal occlusion. Beginning with the incisors, he describes very ably the canine, bicuspid and molar occlusion. Proceeding a step farther, ISAAC B. DAVENPORT (1887) states that "by establishing normal occlusion we can hope to secure results in orthodontia." His clear conception of the normal in occlusion is further illustrated by casts in occlusion showing the buccal aspect in one, the lingual in the other, and diagrams of the transverse molar occlusion.

What was suggested in occlusion during the many centuries anteceding the establishment of orthodontia as a profession, is rounded out and perfected by the master hand of EDWARD H. ANGLE in his work "Malocclusion of the Teeth" (1907). In his estimation occlusion presents not only "the normal human denture in its completeness," but it also "includes the jaws, alveolar process, dental arches, and especially the teeth and periodental membrane which to us are of prime importance." He also includes "the muscles of the lips, cheeks, tongue and mouth, the nasal passages, palate and throat, as these assist the teeth in performing their functions." To him, *"the sizes, forms, interdigitating surfaces, and positions of the teeth in the arches are such as to give to one another, singly and collectively, the greatest possible support in all directions."* "Each tooth," says he, "is not only in harmonious relation with every other tooth, but also helps to maintain every other tooth in these harmonious relations, for the cusps interlock and each inclined occlusal plane serves to prevent each tooth from sliding out of position, and, further, to wedge it into position if slightly mal-

*posed, that is if not beyond the normal influence of the inclined planes."* Therefore, he defines normal occlusion "as being the normal relations of the occlusal inclined planes of the teeth when the jaws are closed."

#### CAUSES OF MALOCCLUSION.

"The discovery of regular processes of expected effects following upon specific antecedents, of constant properties and qualities in the material around him, has from the earliest recorded times been a chief occupation of man" (LANKESTER). Thus, also, with the earliest observation of irregularities of the teeth by HIPPOCRATES (460-355 B. C.) other manifestations are noticed which though not named as causes, were, nevertheless, mentioned in association with the disturbance. HIPPOCRATES in his "Epidemics" finds that "among those individuals whose heads are long-shaped, some have thick necks, strong members and bones; others have strongly arched palates, their teeth are disposed irregularly, crowding one on the other," etc. Although he does not blame the dolichocephalic skull for irregular teeth, he, nevertheless, brings the two phenomena together, leaving the decision as to which is the cause and which the effect for the future.

CELSUS (50 A. D.) attributes the cause directly to the retention of deciduous teeth in that he advises that "if a second tooth should happen to grow in children before the first has fallen out, that which ought to be shed is to be drawn out." The observation of supernumerary teeth by PAULUS AEGINETTA (625-690) prompts him to assert that they are the cause of irregularities. While EGENOLFF (1536) reverts to CELSUS' idea, PIERRE DIONIS (1690) still agrees with AEGINETTA. But it was not until JOHN HUNTER's time (1728-93) that the mechanistic ideas were associated with the causes of irregularities. Thus, HUNTER maintained that "that part of the jaw, which holds the ten foreteeth, is exactly of the same size when it contains those of the second, and as these last often occupy a much larger space

than the first, in such cases the second set are obliged to stand irregularly." ROBERT WOOFFENDALE (1783), therefore, contends that it is the presence or absence of the deciduous teeth that controls the future of the permanent series. And "if proper attention were paid to the removal of the first set of teeth, the just symmetry and proportion of the second might be preserved." This idea seems to have had some effect, as ROBERT BLAKE (1793) by careful study of this problem comes to the conclusion that irregularities are really established during the period of development of the permanent teeth in the jaws, and "that the alveolar arches continue to increase during the entire progress of formation of the teeth." A truly biologic conception.

JOSEPH FOX (1803), nevertheless, in speaking of the etiology, clings to the mechanistic view and names long retention of the deciduous teeth, too large permanent teeth and supernumerary teeth as the causes of irregularity. Habit, as a cause of Class III malocclusion, is mentioned as early as 1810 by JOHN FULLER when he blames some children for the habit "of projecting the under jaw forward" which causes it to remain so permanently. A broader aspect of this phenomenon is assumed by DELABARRE (1819) when he takes into consideration the general disturbances as a hindrance in retarding or preventing "the development of the maxillary bones." This idea seems to have had an influence on F. MAURY (1828), for he also takes into consideration want of development due to general health, but adds defective conformation of the jaw, excessive dimensions of the teeth in proportion to that of the jaw, accelerated development in the dentition of one jaw and retarded development in that of the other, and too large size teeth in one jaw which does not harmonize with that of the teeth in the opposite jaw.

From this period to that of the appearance of Angle's book "Malocclusion of the Teeth" there is an apparent continuity of thought relative to the causes of malocclusion. Thus, heredity, lack

of development of the alveolar arch or of the jaw, too long retention or too early extraction of the deciduous teeth, too large permanent teeth, supernumerary teeth, influence of artificial modes of living as brought on by civilization, habits of finger-, thumb-, or tongue-sucking make up a general consensus of opinion. Those included in agreement as to these factors are WM. IMRIE (1834), KNEISEL (1836), HARRIS (1806-60), RODRIGUEZ (1839), DE LOUDE (1840), NASYMTN (1845), FLAGG (1859), MCQUILLEN (1863), KINGSLEY (1829-1913), SEWILL (1870), HEPBURN (1870), GUILFORD (1874), MAGITOT (1833-97) and others.

Other causes added to these are disturbances in growth (Harris), small jaws of one parent and large teeth of the other (De Loude), single rootedness of anterior teeth causing them to be more frequently irregular, organic malady of alveolar border (Desirabode), prolonged use of an artificial nipple, adenoids and mouth-breathing (Kingsley), rhachitis (Fleschmall).

Special mention must be made of those who through independent efforts in investigation arrived at etiologic factors of an entirely different character. First among them is J. LEFOULON (1841) who advances a series of ideas different in nature from those entertained by most authorities. They are based upon biologic phenomena controlling growth, form, and dimensions of organs and tissues, such as:

"1. Constitutional differences brought about by social, economic and geographic conditions.

"2. Prenatal conditions, producing disturbances in size of the deciduous teeth.

"3. Disease processes, like scrofula, that may affect the size of the permanent teeth.

"4. Sounds of speech in which the tongue strikes against the upper anterior teeth pushing them forward."

This series of causes seems to have made little impression upon those interested in this subject, for the successors of LEFOULON either accepted the



prevailing notions mentioned, or they advanced individual theories. Thus, BRIDGEMAN (1856) formulated the mechanistic ideas in his "Lateral Pressure" theory. To him all forms of irregularity were due to:

1. *Vis incrementi*, external muscular force as that of the lips and cheeks. 2. *Vis extensionis*, internal muscular force, as that of the tongue. 3. *Vis occlusionis*, occlusal force.

THOMAS BALLARD (1864) on the other hand developed his theory of "Fruitless Sucking" as the main cause of irregularities. Under this designation the erroneous practices to which infants are exposed are enumerated as follows:

"(a) Being put to the breast before the milk is secreted; (b) being allowed to suck at a breast which does not yield as much milk as the infant requires; (c) being fed by bottle fitted with a calf's teat, a piece of wash-leather or parchment or a long-used India-rubber teat; (d) or being supplied with a sugar teat which consists of some moistened bread and sugar tied in a rag, and is given to the child to suck in order to keep it quiet."

That Ballard's interesting and keen observations had little influence upon the further development of orthodontia is borne out by the lack of his recognition in subsequent literature. There is, nevertheless, sufficient ground for his contentions to warrant a serious consideration of this matter. Also TALBOT advanced some curious theories on this question. He maintains that "Malnutrition resulting from disease, from insufficient or unsuitable food, and unhealthy environment, is the cause of idiocy, insanity, blindness and other defects. Derangement of the nervous system usually underlies these conditions as found among the poor. But, there is another class of individuals who suffer from neurotic conditions. They are those who are well fed and housed, but have overtaxed their nervous systems by improper modes of life and various forms of excitement. This want of balance produces an osseous system that shows excessive de-

velopment in some of its parts and arrested development in others. Nowhere is this more manifest than in the maxillæ." According to Talbot, then, all malocclusal cases must be neurotics, idiots or lunatics. That this is *not* the case may be testified by the many orthodontists who have had in their charge large numbers of children from various stations of life.

Thus, during the period beginning with HIPPOCRATES (460 B. C.) and ending with the beginning of the twentieth century, there has been an accumulation of the number of discovered causes of malocclusion of the teeth, that no single work written as yet can encompass. Even the work of ANGLE "Malocclusion of the Teeth," complete as it is, besides adding tardy eruption of the permanent teeth, abnormal frenum labii, imperfect fillings, transposed teeth and nasal obstruction, does not claim to have exhausted the probable factors that may enter into the intricate maze of possibilities involved in the etiology of malocclusion of the teeth.

#### CLASSIFICATION OF MALOCCLUSION.

The fundamental evidence of intelligence is thought expressed in an orderly manner. The primary requisite for progress is law and order. Nothing can be more convincing of these truths than the present political and economic situation throughout the civilized world. At no period recorded has there been such a stagnant condition in the affairs of man as since the cessation of hostilities in 1918. The relaxation from the rigid military discipline, the restlessness attendant upon an overstrained nervous system, the sudden change from intense activity to forced idleness, and the resentment to submissive obedience, brought about a chaotic situation that, to say the least, impedes all progress. It is, therefore, an inevitable requirement that before progress can be made law and order must be established.

The inexorable laws that govern general conditions are also applicable to special phenomena. Thus, irregular teeth, like the prevailing conditions de-

scribed, meant probably little more than chaos to the early observer. Just as the brain in its early description was compared to the appearance of a dish of macaroni, so the teeth may have easily been compared to a jumbled mass of various objects. Thus, it is found in the "Songs of Solomon" that in emphasizing the beauty of clean teeth, he likens them to "a flock of well-selected sheep, which are come up from the washing." If the teeth he had in mind were aligned in the form of a flock of sheep, it may be imagined that they were not in normal occlusion.

Thus, irregular teeth, like any other phenomenon that human intelligence perceives, must submit to the demands of law and order before any significant progress can be made in coping with the problem involved. The first attempts made in this direction reveal an effort at sorting out, so to speak, certain forms of irregularity that manifest some gross relationships to each other. Progress must have been exceedingly slow in this particular instance, for not until JOSEPH FOX was a purposive attempt made to classify irregularities of the teeth. It must, however, be stated that differences were observed before, because BOURDET (1737) in his description of the treatment of a case makes the distinction of the deformities that "exist only in the lower jaw, that is, in children who have protruding chins." A direct attempt at classification is made by JOSEPH FOX in 1803. He bases his groups on the difference in the relationship of the anterior teeth; *i.e.*, whether the upper teeth lock labially or lingually to those in the lower jaw. He then subdivides these groups in accordance with the number of teeth that assume such positions.

DELABARRE (1819), though adding nothing to Fox's principle of classification, nevertheless employs a terminology to indicate the several groups, as *overbite*, *underbite*, *edge-to-edge*, and *cross-bite*.

F. MAURY (1828) advances a different series of terms for the same groups of deformities. Thus he chooses "*prominence*, *recession* and *inversion*" for the

first three classes of DELABARRE. THOMAS BELL (1829), on the other hand, classifies irregularities with regard to disturbances in the shedding of deciduous teeth as *temporary*, and where the permanent teeth are crowded, as *permanent*.

F. C. KNEISEL (1836) adheres to the same classification though naming the divisions differently. LEFOULON (1841) follows the same order, while CARABELLI (1842) contributes an additional class, "the open bite," to those described by his predecessors.

PAUL GODDARD (1844) conceives the idea that irregularities of the teeth are of a threefold character: (1) Irregularity of position; (2) irregularity of formation, and (3) irregularity of number.

In M. S. CARTWRIGHT'S (1864) estimation there were "three principal forms of jaws which favor irregularity in the position of the teeth, the *hereditary*, the *congenital*, and the *mechanical*," while N. W. KINGSLEY (1829-1913) was of the opinion that irregularities should be divided according to the following designations: *developmental*, meaning those that occur prior to eruption; *accidental*, those that occur at the time of eruption; *hereditary* and *acquired*. This idea did not find much favor with many, and as may be seen in E. MAGITOT'S (1833-97) writings, anomalies were conceived to be of a more complicated nature. As outlined, MAGITOT'S classification is a more elaborate development of the idea expressed by GODDARD, with the addition of six more classes. Thus he maintains that the teeth may show: (1) Anomalies of form; (2) of volume; (3) of number; (4) of position; (5) of direction; (6) of eruption; (7) of nutrition; (8) of structure, and (9) of arrangement.

The tendency of complicating this phase of the problem undoubtedly reached its climax with the classification of CALVIN S. CASE, "Dental Orthopedia" (1908). In that work he proposes a classification of the forms of malocclusion embracing twenty-six divisions.

Thus, there are first simple and complex irregularities, grouped as follows:



- Group I. Intrusion and Extrusion;  
 " II. Malalignments;  
 " III. Malturnd Teeth;  
 " IV. Contracted and Expanded  
       Arches;  
 " V. Abnormal Interproximate  
       Spaces;  
 " VI. Impacted Teeth.

shall displace its utility and practicality.

#### TREATMENT AND MEANS EMPLOYED THEREFOR.

The early acquisition of skill of hand and power of observation has led to the attainment by man of an extraordinary complex control of the conditions in which his life is carried on.

Then, under "Dento-facial Irregularities," CASE groups the remaining deformities as follows:

- Class I. Maleruption of Cuspids—*Three Types*;  
 " II. Protrusion of the Upper Teeth with Lower Normal—*Five Types*;  
 " III. Retrusion of the Lower Teeth with Upper Normal and Upper Protruded—*Four Types*;  
 " IV. Retrusion of the Upper Teeth with Lower Normal and Lower Protruded—*Five Types*;  
 " V. Bimaxillary Protrusion;  
 " VI. Bimaxillary Retrusion; and  
 " VII. Open Bite Malocclusion.

It must not be omitted to state that this classification is mapped out with the special aim for the types of appliances to be used in their correction.

In this, as well as in other respects, due credit must be given to EDWARD H. ANGLE for the ingenuity displayed in the simplification in number of the varieties within which all occlusal anomalies may be arranged. The fundamental idea conceived by ANGLE is that the "classes are to be based on the mesio-distal relations of the teeth, dental arches, and jaws, which depend primarily upon the positions mesio-distally assumed by the first permanent molars on their erupting and locking." Thus he divides all malocclusal manifestations into three classes, as follows:

Conditions pertaining to teeth, though viewed by many from the ornamental aspect alone, attain considerable biologic significance when the physiologic rôle they are called upon to play in the performance of their several functions is considered. The correction, therefore, of any deviation that the teeth fall heir to, becomes a matter of unquestionable necessity. This inevitable conclusion was arrived at in the dawn of historic times, and the means applicable for corrections sought for at once. Of course, as was held then, and as it is held now to a considerable extent, "The causes of abnormal position of the teeth are almost exclusively of a mechanical nature" (John Tomes). It was, therefore, a logical sequence to combat this disturb-

- CLASS I. Arches in normal mesio-distal relations;  
 " II. Lower arch distal to normal in its relation to the upper arch;  
       *Division 1.* Bilaterally distal, protruding upper incisors;  
               *Subdivision.* Unilaterally distal, protruding upper incisors;  
       *Division 2.* Bilaterally distal, retruding upper incisors;  
               *Subdivision.* Unilaterally distal, retruding upper incisors;  
 " III. Lower arch mesial to normal in its relation to upper arch;  
       *Division.* Bilaterally mesial;  
               *Subdivision.* Unilaterally mesial.

Despite the various criticisms of this classification, it as yet remains for the future to propose another which

ance by like means, *i.e.*, by means of a mechanical nature. Whether the originators of this procedure were correct,

time and history bear abundant evidence. What has as yet not been ascertained, despite the universal adoption of the methods of mechanical procedure, is whether the teeth move in accordance with purely mechanical laws, or whether there are some biological phenomena obscured by the effect of the mechanisms in use that apparently accomplish the results. Leaving, however, this question to be decided in the future, it is of interest, for the present, to note the principles involved and the variety of forms assumed by the mechanical apparatus employed throughout the ages of their application.

Like the origin of the highest developed weapon, the most complex orthodontic appliance began with the bare hand. But as the entire hand was probably of excessive dimensions, for the small parts to be manipulated, a finger thereof evidently sufficed. Thus the earliest record of the treatment of irregular teeth dates to CELSUS (50 A. D.), who after the extraction of a deciduous tooth that was in the way of the erupting permanent successor, used his finger to push the "new tooth daily toward its place until it arrived at its just proportions." This method of procedure is also found in EGÉNOLEFF's work in 1536. AMBROISE PARÉ practiced it, and it is practiced today to a considerable extent. Thus the principles of extraction and mechanical pressure were introduced.

The file came into use during the middle of the seventeenth century, and was employed by ANTON NUCK to remove the "inconvenience and deformed appearance of irregular teeth." The technique for the use of the V-file is given in detail by PIERRE DIONIS (1690). This means introduced a practice of mutilation which was deprecated by many in subsequent times.

PIERRE FAUCHARD (1728) was the first to conceive the idea that in order to exert mechanical pressure by means of an apparatus it is necessary to have sufficient resistance to the force to be exerted. He devised the "band," as he called it, which eventually developed into the modern expansion arch. The "band"

employed by him was constructed in the form of a strip of metal (silver or gold), which was ligated by means of wires or threads to two anchor teeth situated on either side of the malposed tooth, though not necessarily adjacent to it, and by similar means the displaced tooth was drawn toward it. Of course it had to be used either on the labial or lingual surface, depending upon the reverse position labially or lingually of the displaced tooth. He also resorted to extraction and the "pelican" for correction. His contemporaries, A. GERAUDLY, M. BUNON, MOULON, HURLOCK, TOLVER, RUPINI and PFAFF,\* largely followed his practice. BOURDET (1757), though following the same methods of procedure, advises against the use of silver, "which turns black in the mouth." He also recommends the extraction of the premolar when the canine "grows outward," and contends that the latter "will advance gradually toward the space left by the extracted tooth until it occupies its place exactly." Thus, he may be credited with the observation that *teeth migrate when not supported by proximal contact*. JOHN HUNTER (1728-93) besides using the Fauchard contrivance, which he terms a "plate," extending it to the premolars, introduced an appliance for the treatment of "projection, protrusion or prominence of the lower jaw" by utilizing a crude form of intermaxillary force. This appliance, probably in the form of a dental splint, was adjusted on the lower dental arch, and by an inclined plane arrangement extending over the occlusal plane of the anterior teeth exerted a forward force against the upper anterior teeth upon bringing the two jaws in apposition. As a cure for prominent upper teeth he extracted the premolars, and, like BOURDET, expected "the forepart of the circle will fall back." ROBERT WOOFFENDALE (1783) contended that by careful at-

\* PHILIP PFAFF, who was the dentist to Frederick the Great of Prussia in 1776, described the use of wax as a material for impressions, from which he obtained plaster models.



tention to the deciduous teeth, with reference to the proper time for their extraction, irregularities in the permanent series may be prevented.

JOSEPH FOX (1803) deviated very little fundamentally in the construction and application of the expansion arch as devised by FAUCHARD. He nevertheless enhanced its value by extending it to the molars. And in order that it might easily move the upper incisors labially from their lingual position, he attached ivory blocks to the molars so as to open the "bite." He discovered a most important principle; that in order to move teeth it is necessary to apply force, but to accomplish results it is of importance *to remove all obstructions in the path of the moving tooth.*

DELABARRE (1819) contends that "it is much easier to extract teeth than to determine whether it is absolutely necessary." He made a notable contribution in the rotation lever. This, consisting of a spring wire, was attached to a "box" (band) on the tooth to be rotated, by means of a threaded screw end and a tube soldered to the band for this purpose. Then he ligated the other end of the wire to a tooth or teeth at some distance.

For expansion he used wedges of wood or threads between the teeth, and when the teeth were "too large" he trimmed them with a file. He made the first appliance resembling the modern "crib," later perfected by V. H. JACKSON. While there was a tendency of one group of men to invent mechanical means for correcting existing malformations, there was another group who constantly promulgated mutilation. KOECHER (1826) advanced the theory that by the extraction of the first permanent molars before the eruption of the second, all irregularities would be obviated. The space left by the extracted molar would close up by the falling back of the teeth anterior to it, and by the coming forward of the molars posteriorly.

MAURY (1828) devised little S-shaped hooks to prevent the ligatures from slipping under the gum—a notable improvement, considering the damage to

which the gums were exposed. He also employed the inclined-plane arrangement for bringing the upper anterior teeth labially, as was the general practice at that time.

THOMAS BELL (1828) used a modification of the Fauchard "band," but instead of the ivory locks he employed gold caps on the molars, thus reducing the bulk of the appliance.

KNEISEL (1836) invented individual inclined planes soldered to caps on antagonizing teeth, and so corrected those that were displaced. For a rotated tooth he used two such planes, exerting a rotating force on closing the mouth. A crude method. He claimed, nevertheless, to produce results in the course of six days to six months, depending on the age of the patient.

HARRIS (1806–60) employed a modification of the expansion arch, which he attached to swaged caps on the molars. In combination with the arch he employed silk or elastic rubber ligatures. BREWSTER (1841) instead of elastics used spiral springs.

J. LEFOULON (1841), who named the art of regulating teeth "Orthodontosie," was of the opinion that "this subject is unquestionably one of the most vexed in dental medicine." After discussing the pros and cons regarding the extraction of the deciduous teeth, and giving his opinion as to the expedience of such procedure, he concludes with the warning: *"Every day's experience shows us that the teeth, which are at first, to a trifling extent, irregular, will straighten themselves as the circle of the jaw expands. We would urge upon our brethren to take a lesson from nature, who thus re-established the harmony for a moment disturbed."* His most strenuous efforts in antagonizing the practice of extracting teeth for the purpose of regulating others is plainly evident in his contention "that the alveolar arch, like all other parts of our bodies, is capable of extension," and that he opposes "such mutilation as the sacrifice of permanent teeth for the better arrangement of the denture." In children he applied eccentric force by introducing "the thumbs



upon the upper jaw, and by frequent and well-managed traction to force the alveolar arches apart." Both operator and patient were to perform this operation. His aim was first, "to remedy the deformities of the teeth without extraction, except in some rare and entirely irregular cases; and secondly, to simplify the series of means to be employed hereafter to combat the deformities of the teeth." The forces to be employed he reduced to the *concentric* and *eccentric*. For eccentric force he devised a lingual appliance with which expansion was possible, while for the concentric a labial arch was used, judging by his illustrations. Also a rotating lever was employed by him as well as "caps." A modification of the inclined plane was used in the lower jaw for the treatment of projection of the lower teeth.

J. M. A. SCHARGE (1841) perfected the "crib" of Delabarre, and utilized it for attaching the palatal plate as anchorage. By means of the labial arch, ligatures of silk, linen, grass line, or fine platinum or gold wires, various tooth movements were performed. A band, clamped by a screw arrangement, was used by him for the rotation of an upper incisor. This was probably the first clamp band used. Also elastic bands, instead of the labial arch, were used from crib to crib on the buccal and labial surfaces of the teeth to exert traction. He recommends that after the teeth have been placed in position "they must be kept in the place assigned to them for a long time after treatment, in order that they may acquire the proper firmness."

J. S. GUNNELL (1841) claims to have used occipital anchorage in 1822. Modifications of its application were introduced by SCHARGE in 1841 and KINGSLEY in 1886, and later perfected by ANGLE. The principle remained unchanged.

DESIRABODE (1843) sought for anchorage in the teeth having stronger roots than those to be moved. Hooks were used to prevent ligatures from slipping under the gum when the "band" and ligatures were employed. He employed both a lingual and labial "band" at the same time, claiming the appliance

was not original, but "was known to ancients." Plain bands on the molars constituted the anchor points for the attachment of the arches. Desirabode, like our modern orthodontists, is of the opinion that "it is well to take another mold of the mouth after the success of an operation of this kind, as by the comparison with the previous mold we may better judge of the result in all its extent."

C. J. LINDERER (1837) defines direction of movement of teeth, and explains that irregular teeth are to be moved inward, outward, sideways, and rotated. These movements, he states, may be composite.

A method of treatment in vogue at this period and which is entirely lost sight of is by the use of a spoon, toothbrush handle, or hickory stick. The lower teeth were used as the fulcrum, while the hand transmitted the force to be exerted upon the teeth in the upper jaw.

JOHN TOMES' (1847) reasons for treatment are that since "the causes of the reversal of the relative position of the front teeth of the two jaws is purely mechanical, and the defect is maintained by a mechanical cause, our treatment must therefore be mechanical also." His methods of practice were very crude and added little in the advancement of orthodontia.

W. RODGERS (1847) describes his very ingenious "regulator," consisting of the labial "band" or arch attached to two metal shells. These shells were fastened to the molars for anchorage. The ends of the arch were serrated, and accommodated the cogs of a wheel attached to the molar "shells." By the "ratchet" arrangement, this "band" could be manipulated forward and backward, as the modern expansion arch, through the threaded portion and nuts at its ends.

Bone surgery was described by S. P. HULLIHEN in 1849. This was recommended for the correction of Class III cases (Angle). The method was to resect the lower jaw, reducing it in size. This operation, though considerably improved, was later recommended by Angle and others. It never became popular,

owing to the extreme seriousness of its character. It has, however, been successfully performed by a surgeon, Dr. Wayne Babcock of Philadelphia.

One of the most important principles employed for the delivery of force was introduced simultaneously in the United States and England during the same year. Both the American DWINELLE and the Englishman GAINS share the honor of having applied in 1877 the jackscrew, or as some prefer to call it, screwjack, for exerting positive force in the regulation of teeth.

E. BAKER (1846), like most of us, prefers to ride a hobby-horse. His pet favorite was rubber strips and bands. He thought that "caoutchouc, elastic gum or India rubber is admirably calculated to produce the desired effect in regulating teeth." In the form of narrow strips cut from thin sheets, he fastened it "to the tooth to be regulated, and then passed it outside or inside, as the case may require, to the tooth next to the one to be regulated."

I. S. WARE (1848) recommends "a thin gold plate to fit the arch of the superior jaw, and the inside of all the molars and bicuspid and sometimes round the first molars. It should be made to be worn with ease and to be *easily removed* by the patient." This is the first record of the use of removable appliances. "The plate must be removed immediately after every meal, and faithfully cleaned."

JAMES D. WHITE (1850) contributed the spiral spring expansion arch, similar to the modern Canning arch so widely advertised, for the expansion of the contracted dental arches. He utilized them both lingually and labially, slipping them on to a piece of wire soldered to the bands adjusted on the premolars. In addition to the principles hitherto employed WM. LINTOTT (1850) utilized the screw force in connection with the flat labial arch instead of a rubber or wooden wedge to push against the irregular tooth.

THOMAS W. EVANS (1823-1897), like many others who have spent busy lives in active practice, had little time to

philosophize in constructing theories. He attacked the problem of irregularities from the practical side, and on his return to America from France in 1854 brought with him the means to influence a considerable change in the technique of orthodontic procedure. Thus the construction of his appliances was based upon "conditions of promptness and efficiency, and giving the least possible inconvenience to the patient." The four main principles involved in his apparatus were: "1st. A firm support which shall not loosen or in any way injure the teeth to which it is attached. 2d. A steady and sufficient pressure which can be graduated to suit particular cases and particular stages of an operation. 3d. Great delicacy of construction that the apparatus may be as light as possible so as neither to injure nor annoy the patient. 4th. Finally, a mechanism as simple as the case will admit of in order to economize both labor and time."

All of his appliances were ingeniously and carefully constructed. The bands and their attachments in the form of delicate tubes or staples and pivots or hooks were mechanically perfect. Owing to his objection to ligatures because they injured the gum in conjunction with the "band" (arch), he used spiral springs attached to the anchor bands on the molars and to the ends of the arch, obtaining a pulling force. In order to prevent the arch from slipping gingivally, he devised little hooks that were slipped on the arch engaging the incisal edges of the teeth. To make his anchorage firm he, like Schange, adapted a metal plate to the palate, and attached it to the anchor bands. His modification of the "band" or bar (arch) comes dangerously near to its modern form and application. He even uses, in one instance, a horizontal buccal tube on one of the anchor molar bands, the end of the bar being threaded and having a nut on it to prevent its slipping back. Though no new principles were introduced by Evans, he perfected mechanically what was already known.

J. D. WHITE in 1860 introduced the



method of exerting force by a split plate. The plate was united to form a hinge joint, and was attached to bands on the molars. A spiral spring influenced the plate to exert pressure to expand the upper arch.

W. H. ALLPORT (1858) describes an apparatus consisting of a plate attached to bands on the molar teeth and cut away behind the incisors; to the molars a nut was soldered on the buccal side and by means of a bolt the labial arch was screwed tightly in the molar region, forcing the anterior teeth back. For retention, a plate engaging the incisal edges of the anterior teeth was used.

A. WESTCOTT (1859) used a double clasp on either side of the dental arch and a wire across the palate for lateral expansion. This principle was advanced by Lefoulon. For lateral and anterior expansion he made an appliance very similar to that of Farrar. The best advice offered is "Never to be discouraged at a failure." It is probably due to this spirit that orthodontia has reached the position it now occupies. He contends that "no field in dentistry presents a greater scope for the exercise of close study, the correct applications of principles and sound judgment, and none, if successfully cultivated, yields a richer reward in the satisfaction it brings to the operator."

JOHN FLETCHER (1859) introduced a novel method of treating Class III cases. He deviates from the prevalent practice and introduces a new form of intermaxillary force, later used by Angle for retention. Capping the lower molars, which were united by a labial "band" (arch), he then solders an inclined plane to the buccal surface of each lower molar band, against which a wire spur on the upper band plays; and on closing the jaws there is a force exerted pushing the upper jaw forward and the lower backward. The upper arrangement consists of a plate attached to the caps on the molars which carries the wire that glides on the lower inclined plane. This he prefers to the skull and chin caps with the straps that were so much in vogue at that time. This form of intermaxillary force was later and finally superseded

by the *rubber band* as recommended by Baker, Angle and Case.

E. C. ANGELL (1860) took a decided stand against extraction and recommended expansion of the dental arch. This was accomplished by bands upon the premolars on each side of the upper jaw and using a jackscrew to push them apart. On observing the separation of the upper central incisors, he concluded "that the maxillary bones had separated." For moving the premolars distally to make room for the canine, a plate was inserted and from it a threaded wire and nut was projected against the bands on the premolars. By tightening the nut on the threaded wire, the premolars were forced distally.

C. A. MARVIN (1866) calls attention to the necessity of retention for physiologic reasons. He argues that "the teeth which have been brought from an improper to a proper position should be held there immovably, that there may be nothing to prevent the perfect *filling up of the alveolus*, or tooth socket, closely around the roots of the teeth. If they are allowed to move backward and forward, nature cannot accomplish her work and they will not become firm."

NORMAN WARREN KINGSLEY (1829-1913) is inseparably associated with the practice of "jumping the bite." This procedure consisted in shaping the dental arches in Class II cases so as to be in harmony with each other. Then, by bringing the lower jaw forward, into occlusion with the upper, it was retained in that position until this relation became firmly established. By "jumping the bite" Kingsley at once changed the prevailing notion of protruding upper teeth to the true conception of distal occlusion in Class II cases. In his practice he made extensive use of the vulcanite plates in conjunction with jackscrews, elastic bands, the expansion arch and ligatures.

JOHN NUTTING FARRAR (1839-1913) devoted all of his life to perfecting appliances for the delivery of *force to the movement of teeth as obtained from the screw*. He was a mechanical genius and the correction of irregular teeth was to him an intricate mechanical problem, as



may be seen by his complex mechanisms employed in the movement of teeth. Farrar developed the screw force for orthodontic treatment to such an extent as to give his appliances the most grotesque appearance. "The law" which he formulated to guide orthodontic procedures is stated as follows: "In regulating teeth the dividing line between the production of physiological and pathological changes in the tissues of the jaw is found to lie within a movement of the teeth acted upon—allowing a variation which will cover all cases—not exceeding  $1/240$  or  $1/160$  of an inch every twelve hours." Farrar was probably the first to recommend root movement of the teeth.

W. H. COFFIN (1881) introduced a plate used by his father. The Coffin plate, so generally known, found immediate favor and was employed extensively during that period. It consisted of a divided vulcanite plate, the two halves being connected by a piece of piano wire bent to the shape of the letter W. It was held in place by either caps or clasps on the molars and by means of the spring in the wire exerted lateral pressure, or expansive force.

S. H. GUILFORD (1874) argues that "The three motions to be produced in the treatment of all cases of irregularity are: expansion, contraction and rotation, or tension, traction and torsion." He advocated extraction of the first permanent molars and substituted vulcanite for metal in the construction of the plates.

E. MAGITOT (1833–1897) made extensive use of the vulcanite plate with holes in the anterior part drilled into it to accommodate wooden pegs that exerted a wedging pressure against malposed teeth. Also rudimentary cribs were used by him in conjunction with the plates.

THOMAS BRIAN GUNNING in 1881 suggests the idea of bodily movement of the teeth, when by the use of a modification of the "regulating plate having soldered hooks" he contends that the "apex of its root is carried out with its crown, especially in the lower incisors and the

upper laterals, whose thin roots move readily in the alveolar process."

J. J. R. PATRICK in 1882 describes an expansion arch made of half round wire with two molar bands that slide upon it by means of neatly fitting tubes. Buccally, these bands could be anchored to the arch, or *vice versa* by thumb screws. "To smaller slides on the arch different accessories for moving teeth are attached, as wedges, hooks, T-bars, loops and bands of various sizes and shapes as required." Rubber bands and ligatures were also used. In 1882 he substituted the clamp band for the plain anchor band.

The introduction into dental practice in 1879 of the various dental cements made it possible for orthodontic appliances to be better and more firmly attached to the teeth and at the same time to save the tooth structure. MAGILL enjoys the distinction of having cemented the first plain band on a tooth in 1871.

It must be stated that the principles for delivering force in general evolved in the course of centuries with the development of physics and its application in the various industries of the world. The application of these principles for the movement of teeth was as gradual as their evolution. The methods for their application developed in accordance with the knowledge, skill, likes and dislikes of the individual, and therefore, assumed as manifold an aspect as the number of individuals employing them. Fortunately they did not all survive. Nature through her inexorable law of selection played an important part. But the agents through whom she accomplished the weeding-out process were certain individual minds through whose keen perception of what is useful and what is useless orthodontic mechanics assumed the aspect of a systematic procedure.

Thus, a twofold manifestation is made evident in the perfection of the means on hand for the treatment of occlusal anomalies. One is based on the perfection of the principle and practice originated by FAUCHARD (1728) and the other on that of WARE (1848). The

former maintains that the force of the expansion arch and its fixed adjustments, with the aid of all the modern improvements and accessories, is sufficient to yield the best results; while the latter contends that appliances in order to be efficient must be removable, especially for hygienic purposes. The greatest champions of these views have worked and defended their ideas so persistently that the systems have come to be known by their names.

Thus malocclusion is known today to be treated by either the **ANGLE SYSTEM** of appliances, which has been repre-

riety of forms of individual manifestation of occlusal deviations. Thus, while the former aims at general systematic order and arrangement with a view to facilitating educational methods, the latter manifests a traditional attitude of individual instruction and specific application.

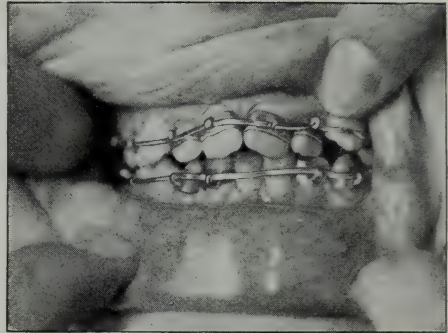
As it is taken for granted that the readers are, or *should be*, well acquainted with the existing orthodontic appliances, the detail of modern principles and practices will be omitted. And since the originators of the modern methods are still counted among the living, con-

FIG. A.



Appliance by Potpeschnigg (1875).

FIG. B.



The Ribbon Arch Appliance by Angle (1918).

sented by the expansion arch, molar bands, plain bands, wire ligatures, and diverse minor accessories; or by the **JACKSON SYSTEM** of appliances, consisting of a perfected "crib" originated by **DELABARRE** (1819) and a modification of the W-shaped wire as used by **COFFIN**. Between these two extremes many other so-called systems or methods appeared, but they cannot be considered as independent manifestations, for they either lean toward the one or the other appliance.

Of the Angle and Jackson ideas, it must be added, the former is a simplified, systematized course of procedure involving mainly the principles of treatment as based upon the Angle classification of malocclusion, while the latter consists of a mechanical training in the making of appliances for the great va-

tinuing to improve and perfect the various devices and procedures, it will be left to them to stimulate the world to the consciousness that the development of orthodontic appliances is still in its progress, and that it has not as yet reached its final stage of perfection. The extent of progress in the refinement of orthodontic appliances will be evident at a glance by the accompanying illustrations.

#### CONCLUSION.

A conglomeration of facts, observations and theories does not constitute a science any more than a heap of bricks, lumber, concrete and various other building materials constitute an edifice. In the case of the latter, the architect must design plans and the builder must utilize his forces that each part so designed be



put in its place, in order to complete a structure. So in the former, theories must be analyzed, observations verified, and the facts used as evidence before scientific truth can be established.

It may likewise be said that an accumulation of observations, a collection of appliances, a manifold manner of their manipulation, and a variety of results do not constitute a profession. A practical purpose, enhanced by a uniform educational system, with a general aim and common interest and an exchange for ideas, are the requisite fundamentals for the construction of a professional background. In no other of his numerous achievements will Angle have earned the exalted distinction as the representative of modern scientific orthodontia, so much as by the realization of the urgent necessity of an educational institution. Thereby he showed the courage of his convictions that the teaching of orthodontia at dental colleges was not practicable. "This is abundantly proved" says he, "by the fact that although orthodontia has been a part of the curriculum of all dental colleges from HARRIS' (1839) time down, not one dental student in all that time has gained sufficient knowledge of the subject in the dental college to enable him to practice it with sufficient success to make it his sole means of gaining a livelihood, in spite of the immense number of these deformities in every community." "Having become entirely discouraged" continues Angle, "with my experiences in dental colleges, I became filled with the belief that if orthodontia was to make any material progress, a separate school, entirely independent of dental schools, must be formed, which would amply provide opportunity for those with aptitude and liking for the subject to study in a broad, thorough and comprehensive manner, and where it would be relieved from all blighting, handicapping influences which are necessarily thrown around it in dental colleges. Hence was founded the Angle School of Orthodontia." The establishment of his, the first postgraduate, school of orthodontia occurred in 1900.

By this act, the foundation of ortho-

dontia as a specialty was laid. But in order to fulfill the other requirements for an independent profession, he also realized the necessity of an organization where, by proper intercourse and interchange of ideas of individuals having mutual interests, orthodontia could be still further promoted. He, therefore, in 1901 organized the American Society of Orthodontists. This, however, did not complete his insatiable desires to further the interests of his specialty. And to fulfill the last requirement, he was also instrumental in the establishment (1907) of an independent journal, *The American Orthodontist*, wherein the records, proceedings and all topics of interest to orthodontia were to be published. Thus, with an independent *Journal*, a *Society* and a *School* for the promulgation of Angle's ideas, principles and ideals, a specialty was created which instantly gained world-wide recognition. It must, therefore, be granted that, what *Charlemagne was to culture, what Harris was to dentistry, Angle was to orthodontia.*

In the preparation of the above article it was necessary to consult various authorities, and as it was deemed inadvisable to make reference in the text, it is with considerable gratitude that this obligation is fulfilled now. The works in question are:

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E. R. LANKESTER. "Nature and Man," 1905.

HENRY F. OSBORN. "Men of the Old Stone Age," 1914.

EDWARD H. ANGLE. "Malocclusion of the Teeth." 1907.

CALVIN S. CASE. "Dental Orthopedia," 1908.

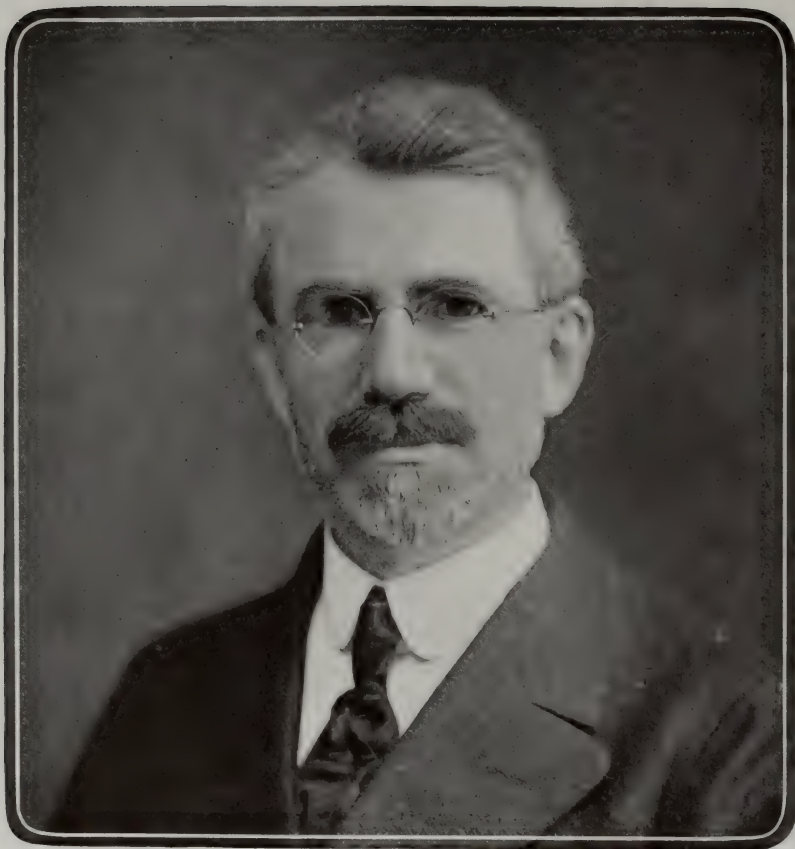
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*Hermann Prinz.*

HERMANN PRINZ, D.D.S., M.D., A.M., Professor of Materia Medica and Therapeutics in the Thomas W. Evans Museum and Dental Institute, scientist and teacher, has brought to bear on the therapeutic problems confronting the profession the influence of a well-trained mentality and has had much to do in raising the therapeutic aspect of dental practice from one of chaotic empiricism to that of an exact science.

Unassuming, amiable, and courteous in his manner, with an unremitting diligence in the pursuit of knowledge, he has ever been the student of the subject of his choice and possesses the firmness of faith in his conclusions that is born of a thorough knowledge derived from scientific study and observation. No one is better qualified than he to expound the developmental evolution of Dental Materia Medica and Therapeutics, the subject of his contribution herewith.



# An Historical Review of the Evolution of the Therapeutic Concept.

By HERMANN PRINZ, A.M., M.D., D.D.S., Philadelphia, Pa.

THE evolution of the medical specialist within the province of the general practitioner received its present impetus with the dawn of the nineteenth century through the introduction of specific research. However, even in the remotest periods of medical history we meet with examples in which physicians confined their activities to the treatment of special diseases. Apparently there has always existed a desire on the part of the general practitioner to limit the field of his activities to the care of disturbances of single organs, or to the treatment of specific ailments. Herodotus, for instance, makes a very positive assertion regarding the specialization among the Pastophores—the Egyptian physicians. He states that: "Medicine is practiced among them (the Egyptians) upon a plan of separation; each physician treats a single disease and no more. Thus the country swarms with medical practitioners; some undertake to cure diseases of the eye, others of the head, others again of the teeth, others of the intestines, and some, others which are not local."

In the early writings of the Zend-Avesta, definite instructions are given to the surgeon, "that he must first thrice essay his skill upon a slave or on a lower caste of man before operating upon their betters." Among the Greeks medical specialists apparently were quite common. Plato in the "Charmides" records the following pertinent complaint as made by Socrates regarding the increased tendency of specialization: "And this is the reason why the cure of many diseases is unknown to the physicians of

Hellas, because they are ignorant of the whole, which ought to be studied also, for a part can never be well unless the whole is well." Similar conditions prevailed among the Romans; their leading physicians were either native Greeks or they had received their medical education on Greek soil. To receive proper recognition by the medical fraternity it was essential for the young practitioner of ancient times to include in his curriculum a pilgrimage to the world-famed shrine of knowledge, the University of Alexandria. From the time of its foundation by Alexander the Great, about 320 B. C. to its destruction by Omar, A. D. 641, this exalted seat of learning exercised a most wholesome influence on the higher types of education in all its branches of the then known civilized world.

The paralyzing influence of the medieval age on scientific matters in general impressed its stamp of retardation also indelibly on the development of medicine. The only bright star in this period of papal despotism is the appearance of Paracelsus, the "Luther of Medicine," as he has been appropriately christened. Paracelsus taught doctrines essentially his own and strongly condemned the existing methods of teaching. He denounced the custom of blindly following the teachings of Celsus, Galen, Avicenna and other orthodox writers, and, on the Feast of St. John, 1527, the students having lit a bonfire in front of the University of Basel, Paracelsus seized the opportunity to throw a copy of Avicenna's "Canon of Medicine" into the flames, exclaiming: "Into St. John's

fire, so that all misery may go into the air with the smoke."

Paracelsus' basic idea of therapeutics was founded upon the conception that each remedy influenced the spiritual force (*archaus*) and not the material substance, because the medicine contained another spiritual force or active principle (*quinta essentia*). This quintessence could be isolated from the drugs by making tinctures and alcoholic extracts. He therefore improved these preparations, and opposed the polypharmacy of the Arabians. His strongest point is portrayed in the teaching of applied therapeutics. Paracelsus had two therapeutic aims, *i.e.*, to assist the *archaus* (force of nature), and to oppose the cause of disease. He believed in the *signature* of crude drugs, *i.e.*, the significance of their form or structure as indicative of their therapeutic use, as: the seeds of pomegranate (like teeth) were employed by him for toothache; lungwort (spongy tissue) for lung affections; orchid bulbs for testicular disease; the thorn of thistle for sticking pains, etc.

Fortunately, medicine has had its renaissance. With the reorganization of the Vienna Medical School by Van Swieten in 1750, scientific research received a reverberating impulse, and its vibrations are felt at the present time. Laryngology saw its birth in 1855 with the introduction of the laryngoscope, more or less simultaneously, by Garcia, Czermak and Türk; although Liston had stated in 1837 that "the existence of the swelling laryngeal mucosa can often be ascertained by means of a speculum; by such a glass as is used by dentists on a long stalk previously dipped in water, etc." The dental mirror, by the way, the most utilitarian instrument of our whole armamentarium, was introduced about 1800 by Chevalier Bartolomeo Ruspini, a prominent Italian dentist then practicing in London. There seems to be sufficient evidence to assume, however, that the Roman surgeons at the beginning of the Christian era used such an instrument for the inspection of the oral cavity. The divorcing of ophthal-

mology from surgery was largely brought about by the fundamental operative work of von Graefe (1850) in which he was materially aided by the invention of the ophthalmoscope by Helmholtz in 1851. About this period the knowledge of diseases of the ear was placed upon a rational basis by Politzer and Gruber, and Hebra founded the science of dermatology.

The most remarkable achievements in the specific domain of major surgery are to be accredited to two epoch-making events, namely, the discovery of general anesthesia and the introduction of antiseptics. "If America has contributed nothing more to the stock of human happiness than anesthetics the world would owe her an everlasting debt of gratitude," wrote the late Samuel D. Gross, the eminent surgeon, who had ample opportunity to observe in his own operating-room the vast change that followed the introduction of this boon for the relief of suffering humanity. To the dental profession of the United States belongs the honor of having introduced the first practical method of obtaining complete anesthesia. With the introduction of nitrous oxid by Horace Wells, in 1844, the stimulation of further research in this particular field was initiated, and the future development of anesthesia was merely a sequence to the incentive given by this New England dentist. The introduction of local anesthesia by Koller into minor surgery, in 1884, is of equal importance, and some of the recent developments in the treatment of diseases of the eye, ear, nose, and oral cavity depend almost exclusively upon the remarkable achievements obtained through the possibilities of inhibiting sensation within circumscribed areas of tissues.

#### DENTAL PHARMACOLOGY.

The early history of dental medicine is so closely interwoven with that of medical therapeutics that it is impossible to distinguish it from its mother science. The Babylonians, Egyptians, Assyrians, Hebrews, Greeks, and Romans were the



earliest cultured inhabitants of whom historical records exist. The recent excavations in Babylon have brought to light some interesting facts concerning the practice of dentistry under King Hammurabi, at about 2250 B. C. The law stated that "if one knocks out a tooth of one of his caste, his own tooth shall be knocked out, while, if it is the tooth of a freeman, he shall pay one-half mine silver." The Egyptian medical history is principally recorded in the various papyri, especially those of Ebers and Brugsch, which probably cover the period from 3700 to 1500 B. C. As the Egyptian physicians were largely specialists, it is very probable that some were selected to look after the welfare of the teeth. Most of the dental remedies found in the papyri consist of pastes, powders, plasters, decoctions, etc., in which St. John's bread, sage seed, honey, and some unknown plants play important parts. The treating of abscesses, caries, and loose teeth seems to have been known.

The Hindus were apparently very proud of their teeth. It is recorded that the use of toothpowders and washes, and especially that of a tooth cleaner, "rinacarya," were necessities of their daily toilet. As a toothpick they employed a bitter tasting wood, which when chewed produced a fibrous bundle, which was then used as a brush for the gums and the teeth. The aborigines of the western coast of Africa and of various South American countries are still using the wood of the *sissako* and *molungo* tree for such purposes, and a toothbrush of this very same nature has been recently introduced in the United States, in Great Britain, etc. In the writings of Hippocrates and Pliny frequent allusion is made to drugs which were especially advocated for diseases of the teeth and the mouth. With the simpler remedies, as hyssop, licorice, dog's milk, goat's butter, etc., many disagreeable substances, especially of the animal kingdom, were recommended. In Pliny's writings we find, among dental suggestions, that "if one wishes to be free from toothache, one should eat a whole mouse twice a month."

The ancient writings on dental therapeutics contain so many conflicting statements relative to the sources of specific medications that it is extremely difficult to reach an unbiased decision regarding their origin. Plagiarism was a common practice among the early scribes; it was, however, not looked upon as a breach of literary etiquette in the same sense of the word as we interpret that term today. As an illustration we may be permitted to cite Pliny (79 A. D.), who in his famous "Naturalis Historia" prides himself on the fact that he is able to present excerpts from nearly one hundred writers and their thousand works. He is honest enough, however, to name these authors, while many of his colleagues of this and later periods prefer silence on this point. Even the renowned Galen owes most of his botanical knowledge to the *materia medica* of Dioscorides, which he duly acknowledged. Again, the seven books of Paulus Aegineta are primarily compilations culled from Galen and Oribasius.

The dental therapeutics as presented by the more important Greco-Roman writers: Galen, Oribasius, Celsus, Aetolianus, Paulus Aegineta, etc.; the Arabo-Persians: Rhazes, Ali Abbas, Abulcasis, Avicenna, and Mesuë; the early Germans: Schenck von Grafenberg, Heinrich von Pfolssprundt, and Ryff; the early Italians: Arculanus and Vigo; and the early French: Guy de Chauliac, Valescus, Paré, and Houillier; all in their final analysis, are culled from Dioscorides. Especially Avicenna, whose treatise on general medicine, the "Canon," enjoyed for many centuries equally as high a reputation as did the works of Galen, has been a flagrant plagiarist of Dioscorides' dental medicine. And Walther H. Ryff that "jack-of-all-trades," to whom Haeser refers as "the roving plagiarist," compiled his dental medicine from the same source via Arculanus. The dental remedies referred to by that mixture of charlatanism and necromancy, John Gaddesden, sometime professor of Merton College, Oxford, are so thoroughly tainted by medical avarice, superstition, and ignorance



that it would be an insult to the enumerated writers, if we should place him in the same category. Merely to mention a typical example of the disgusting therapeutic measures recorded in his bizarre tome, "*Rosa medicinæ*," which has been significantly dubbed by the illustrious Guy de Chauliac, "*Rosa fatua*," the following "*mixtum compositum*" in the form of a decoction, which he recommended to be taken against dental podagra (neuralgia), may be cited: The gall of a cow, wormwood, alum, pepper, nutgalls, cloves, pitch, mustard seed, the heart of a magpie, the fat of mice, crow-dung, plantain and lice.

The famous German "*Artzney Büchlein wider allerlei Kranckheit und Gebrechen der Zeen gezogen aus dem Galeno, Avicenna, Mesuë, Cornelio Celso*," etc., Leipsic, 1530, is an anonymous compilation which, as far as its pharmaco-therapeutics is concerned, merely exhibits the same stigmata as do the works of the above-mentioned writers, *i.e.*, it is an epitome from Dioscorides' dissertations, with slight alterations, as a sequence of having passed through revisions influenced by the works of the various authors enumerated on its title-page.

In a most interesting collection of Anglo-Saxon manuscript bearing the quaint title "*Leechdoms, Wortcunning and Starcraft*," which in modern English would signify "*Medicine, Materia Medica, and Astrology*," republished some decades ago in London, numerous references relating to the diseases of the teeth are contained. Here, again, one meets with many drugs which are readily traced to a dissemination of dental knowledge by the Greco-Roman military surgeons accompanying the conquering cohorts during their occupation of Britain.

It is probably not amiss to depict at this moment a conception of the practice of medicine and incidentally of dentistry, as one may gather it from the study of the medical works written during the early centuries of the Christian era. The freeborn Roman looked upon

the practice of medicine and surgery, as a handicraft (*chirurgius*—handiworker), the pursuit of which was not compatible with the dignity of a *civis Romanus*. Medical practice prior to its invasion by the better educated Greek physicians was carried on by slaves; the larger estates depended on their *servus medicus*, a slave who had acquired some routine medical knowledge, or the ills of the subjects of the household were looked after by the patriarchal *pater familias*. Some of these latter representatives of lay medicine gathered together quite an extensive knowledge of the healing art, and their recorded experiences furnish some of the most valuable data to the medical historians. Celsus, Pliny, and Cato are elucidative types of Roman lay practitioners, and incidentally are voluminous and fruitful litterateurs on this subject.

To the cultured Romans, who were highly conscious of the blessings of personal hygiene, the demand for the services of some genius who could keep their masticating organs in perfect condition was a matter of necessity. The works of medical writers of this period are filled with innumerable recipes for tooth preparations. The mechanical side of dentistry, which by necessity must have been carried out by specialists, has received its ample share of consideration as is testified by an excerpt from the famous Law of the XII Tables, enacted 450 B. C., which contains the following paragraph: "Neither shall gold be added thereto (to the corpse); but it shall not be unlawful to bury or burn it with the gold with which the teeth may perchance be bound together." Numerous specimens of Roman and Etruscan dentistry have been found in burial-places.

With the exception of a few monographs, the early literature of dentistry is found scattered among the various treatises of general medicine. In the large majority of instances these records are published by medical practitioners, although sometimes by laymen who themselves did not practice the art of dentistry. Prior to the appearance of "*Le Chirurgien Dentiste*" (1728), by Fau-

chard, who has been significantly styled the *Restaurateur de la chirurgie dentaire*, dentistry is not entitled to the cognomen of a "learned profession." In reality it constituted the handicraft of vagabonds who traversed the country from one end to the other practicing medicine, dentistry, alchemy, chiromancy, and necromancy as occasion demanded, now and again interspersing these with pilferings.

The professional mountebank who presented himself as a tooth-puller, barber, leech, and theriac vender was a familiar figure in the market-places of the big cities or at the annual fairs of the smaller towns. The extraction of the aching tooth was incidentally an incentive for the sale of some tooth preparation or an amulet for the prevention of the occurrence of pain in the remaining teeth. The *dentatores* or *dentispices* of the Romans, the *cavadenti* of the Italians, the *arracheur des dents* of the French, the *Zahnbrecher* of the Germans, and the *kindhart* of the English represented the bulk of our professional ancestors. Henry Chatlee of London published an interesting volume in 1539, in which he describes this latter itinerant tooth-drawer. Usually he was rigged up in a fantastic costume, wearing a cap on which he displayed conspicuously a large leaden brooch, being an effigy of St. George, which was commonly regarded as one of his peculiarities. To signify his profession he had his belt garnished with a string of extracted teeth. Chatlee defines this professional charlatan in the following way: "Gentlemen and good fellows, whose kindness having christened me with the name of 'Kindhart' binds me in all kind course I can to deserve the continuance of your love. Let it not seem strange, I beseech ye, that he that all the days of his life hath been famous for drawing teeth should now in drooping age hazard contemptible infamy by drawing himself into print." The keen-pointed pencil of the satirist Hogarth has left us a barber sign, displayed in that famous thoroughfare Charing Cross (about 1740), with that famous legend: "Shaving; bleeding, and

teeth drawn with a touch. *Ecce signum!*" In Paris, during the sixteenth to the eighteenth centuries, the "Pont-Neuf" was the common meeting-ground for establishing the "*theatre ordinaire de ces imposteurs*," as Fauchard ironically refers to it; and at least one of these "*arracheurs de dents*," Le Grand Thomas, as he styled himself, succeeded in being counted among the "Immortals."

Prior to 1840 comparatively few important communications on dental surgery had appeared. The foremost literature of this time was published in France and England, and a few books of importance appeared in Germany. The United States was at this period principally concerned with the practical development of this new branch of healing art, and, with the exception of the writings of Longbotham, E. Parmly, L. S. Parmly, Flagg, Tenor, Fitch, Boswick, Spooner, Solyman Brown, the Burdells, and others, little was printed in relation to dentistry. Dental textbooks, if used at all, were imported from England, or translations of French works were published. Leonard Koecker, a practitioner of international reputation, pictures the situation quite correctly when he stated; in 1826, that "in the United States, although little or nothing has been done in the way of publishing on the subject of dental surgery, yet I feel myself authorized to say that in no part of the world has this art obtained a more elevated station." It must also be remembered that the individual practitioner of this period was extremely jealous of any special knowledge which he happened to possess, and he usually guarded this acquired proficiency very carefully. No specific current dental literature was in existence at this time, and comparatively few medical journals tried to disseminate the progress of medical and, incidentally, dental knowledge. The few journals were seriously hindered in this laudable cause by the extreme difficulties of interchanges on account of the very limited facilities of the postal service.

The first dental periodical of this or any other country appeared in 1839



under the name of *American Journal of Dental Science*, and was published by E. Parmlly, E. Baker, and S. Brown.

The first regularly organized dental society of any importance was the "American Society of Dental Surgeons," which was founded in New York on August 18, 1840, with Horace H. Hayden as president. The birth of dentistry as a distinct and definite profession may be recorded simultaneously with the date of incorporation of the first dental college of the world, the Baltimore College of Dental Surgery, which received its charter in 1839. Its first session commenced in the following year, with a faculty composed of Horace H. Hayden, Chapin A. Harris, Thomas E. Bond, and H. Willis Baxley. Medicine and dentistry were from that year practically divorced, and, while dentistry in its early days depended very largely on medicine for its further development, it bases its fundamental studies at present on general biology exactly in the same manner that medicine, veterinary medicine, or any other branch of the healing art is forced to do.

#### PATHOLOGY.

The historical evolution of the practice of the medical art distinctly indicates that it has always been governed by the ruling notions of general pathology. The early fathers of medicine regarded the animal body in its physiologic concepts as being composed of the four elements of Empedocles, *i.e.*, fire, water, air and earth. As a consequence, the body contained as an inherent property four cardinal juices, the humors, *i.e.*, blood (*sanguis*), phlegm (*phlegmon*), yellow bile (*cholor*), and black bile (*melancholor*). Life was supposed to depend upon a proper mixture of these humors (*eucrasia*). Whenever this normal equilibrium of the humoral mixture became disturbed, disease (*dyscrasia*) resulted, producing abnormal temperaments (*complexiones*), such as dryness, moisture, heat and cold. As a consequence, this humoral conception of the nature of disease which was principally fostered by Hippocrates is referred to by

the medical historian as humoral pathology, and its predominating influence was recognized up to the middle of the fifteenth century. A strong impetus was given to it by the great Greco-Roman physician, Galen. He considered an abnormal condition of the blood as the primary cause of disease; to him any deviation from the normal indicated putrefaction and, as a consequence, his therapy centered in the administration of drugs which caused elimination (cathartics) and in the regulation of the diet. The dogmatic influence of galenic therapy which held undisputed sway for more than fourteen centuries received a severe check by the introduction of chemistry into clinical practice by Paracelsus.

He conceived disease as being the result of an abnormal manifestation of life. He taught that the body juices became altered and thereby blood-poisoning resulted (*acrimonia*) and, consequently, only physiologic therapeutics must be employed to reconstruct the deranged system. These iatrochemic therapeutic suggestions find their expression in the administration of hygienic measures, including feeding, use of the many spas and the group of drugs known as *alterantia*, *i.e.*, drugs which so favorably modify nutrition as to overcome morbid processes. Sylvius was one of the strongest exponents of the theories of Paracelsus and materially assisted in the popularization of his teachings in France. The discovery of the circulation of the blood by Harvey and the introduction of scientific methods in the study of morbid anatomy by Malpighi, which bore most excellent results in the hands of John Hunter, laid the foundation for a more ready comprehension of the nature and causes of disease. Andral of Paris and Rokitsansky of Vienna were the principal modern exponents of humoral pathology.

The teachings of humoral pathology were by no means universally accepted. Almost simultaneously with its inception we find the creation of a second school, which based its conception of disease upon the composition of solid natural organic and inorganic substances as con-



ceived by the Greek philosopher, Democritus, *i.e.*, the existence of atoms. His doctrine centered about the hypothesis that all material substances were composed of these atoms, and, as a consequence, the density of a mass depended upon the relationship of the spaces between their surfaces which were filled with air. Health (*status strictus*) was an expression of normal equilibrium of the affinity between atoms and space, while disease (*status laxus*) indicated a greater or lesser density of the relative space occupied by the atoms. Medical historians refer to Democritus' conception of disease as solidar pathology; in general, it has received only meager support.

Humoral pathology and so-called rationalism in therapeutic procedures were the two predominating factors which governed the practice of medicine and, incidentally, of dentistry, at the beginning of the eighteenth century. This supposed rationalism started almost simultaneously in various parts of Europe. Sydenham of London, Boerhaave of Leyden, Van Swieten of Vienna, Hoffmann of Halle, and Stahl of Berlin, were the most influential exponents. The growing tendency of overdrugging received a healthy check through the introduction of Hahnemann's method of treating disease with very small doses, which, combined with other extreme changes in therapeutics, resulted in the foundation of the homeopathic school. No definite knowledge regarding drug action had become available to the practicing physician, and as a consequence of the empiric administration of drugs, it became customary to ridicule those who regarded drugs as necessary in the treatment of diseases. Especially Skoda and Dietl, of the Vienna school, expressed erratic views in regard to drug medication, and both extremists carried the idea of drug nihilism to such an extent as to almost eliminate materia medica from the curriculum of the study of medicine. Dietl was wont to express his extreme skepticism regarding the action of drugs in this dogmatic statement, "There are no real therapeutists, there

are only lucky physicians." Bearing in mind the fact that no tangible knowledge of pharmacology existed at that time, our judgment of these outbursts of overzealous minds is materially modified when we consider that even at this day the drugless "Christian Scientist" and the supporter of the "Emmanuel movement" hold sway in the minds of the credulous.

About the middle of the last century a complete change in the conception of the causes of disease and the subsequent administration of remedial measures for its eradication occurred, which must be primarily credited to the ingenuity of the master mind of Rudolf Virchow. His name will be forever indelibly engraved upon the records of medical lore. The ready comprehension of the present possibilities within the domain of clinical pathology is made possible only by an intelligent study of his doctrine. The revolutionary change took place with the publication of his work on "Cellular Pathology" in 1858. "These lectures," as he states in the preface of this classic in modern medicine, "were particularly intended as an attempt to offer, in a better arranged form than had hitherto been done, a view of the cellular nature of all vital processes, both physiological and pathological, animal and vegetable, so as distinctly to set forth what even the people have long been conscious of, namely, the unity of life in all organized beings, in opposition to the one-sided humoral and neuristical tendencies which have been transmitted from the mythical days of antiquity to our own times, and at the same time to contrast with the equally one-sided interpretations of a grossly mechanical and chemical bias the more delicate mechanism and chemistry of the cell."

The doctrine of cellular pathology as expounded by Virchow is very slowly but steadily being recognized within the specialized field of dental medicine and surgery. Such names as Wedl, Tomes, Saunders, Abbott, Magitot, Metnitz, Barrett, Burchard, Miller, Boedecker, Black, and many others who are still at work and too numerous to mention, will

forever be recognized as leaders who have been or are still actively engaged in assisting in the slow metamorphosis, which, by necessity, our chosen calling had to undergo to entitle it to the cognomen of a learned profession.

#### THERAPEUTICS.

Arkövy has said that "in operative dentistry, empiric therapeutics has reached far ahead of pathologic knowledge." The truth of this statement finds its explanation, as we have stated above, in an absence of organization of the comparatively few dental practitioners prior to 1840. No specific books on dental remedies were then in existence, and the little knowledge concerning the action of drugs was scattered through the few dental works, or it was closely guarded by its possessor. Since then quite an extensive literature on dental materia medica and therapeutics has appeared, which furnishes ample proof of the immense strides made, especially in the last decade, in this particular phase of dental science. The drugs which were principally applied as dental remedies were usually such agents as were also employed, according to their therapeutic indications, for disturbances of similar pathologic nature in other parts of the body. Prominent among these remedies are the commoner astringents (nut-galls, oak bark, myrrh, alum, etc.). Of the caustics, silver nitrate and mineral acids, especially nitric acid, were much in vogue. Arsenic trioxid has always occupied an important place in dentistry as a powerful caustic. In 1836 it was recommended by Shearjashub Spooner for the purpose of destroying the dental pulp, and in spite of the many substitutes offered it still maintains an enviable reputation for this purpose. Creasote, and to a still greater extent phenol, which was discovered by Runge in 1834, have always been favorite remedies, which were employed as caustics, obtundents, and, unwittingly, as antiseptics. The antiseptic era was, however, inaugurated by Joseph Lister many years later. Many of the essential oils

(the oils of clove, cinnamon, peppermint, spearmint, turpentine, etc.) have been employed for many centuries as obtunding agents in the treatment of pulpitis, and they have always enjoyed quite a reputation as flavoring agents for mouth preparations. Aromatic and analgesic fomentations, *i.e.*, henbane, poppy heads, hops, ground linseed, or roasted figs, and bruised raisins, occupied a prominent place as antiphlogistics for the relief of inflammation about the teeth and their adnexa. Of the true analgesic drugs, opium and aconite are probably the most important representatives. Among the aromatic tinctures and lotions which were used as soothing and healing mouth-washes, alcoholic extracts of balsams and resins, as myrrh, frankincense, benzoin, mastic, etc., and decoctions and infusions of herbs, barks, and roots, as arnica, anise seed, clove, cinnamon, chamomile, sweet flag, ginger, marigold, scurvygrass, mallow, sage, etc., were in common use. Innumerable formulæ for toothpowders are found in the older works pertaining to the treatment of the teeth, and consisting largely of a base made from prepared chalk, burnt oyster shells, charcoal, crabs' eyes, Armenian bole, pumice stone, etc., mixed with cuttlefish bone, magnesia, vegetable powders, especially spices, and coloring materials.

In the early days of medical practice the physician or the dentist was forced to prepare his own compounds, since pharmacies, as we interpret this term today, were not in existence. These compounds were usually complex mixtures and are still known as galenical preparations in honor of the illustrious Galen who was the originator of many of these decoctions. With the separation of pharmacy from medicine in the twelfth to the fourteenth century in continental Europe, and much later in England, and with the publication of the first pharmacopœia (Florence, 1498) the writing of prescriptions became an important part of the physician's routine duties. According to the ruling fashion—and the practice of medical art, including dentistry, has always been governed by it—the remedies employed in treating dis-



eases were in accordance with the predominating school.

The number of remedies which are at the disposal of the physician are countless; the drugs of real merit, however, may be gathered within a small compass. In the Ebers papyrus, for instance, about eight hundred remedies are enumerated, and Dioscorides describes about a thousand drugs. Again, in the *Pharmacopœia Medico-physica*, published by Schröder in 1764, the goodly number of six thousand remedies is recorded. We probably gain a better understanding of the use of these many drugs when we remember that about that period polypharmacy had reached its zenith. In those days the combination of ten, twenty, or even more simple drugs in a single prescription was a routine practice. For instance, such mystic compounds as theriaca and mithridate, which enjoyed a world-wide reputation in their days as "cure-alls," were concocted of seventy-five different ingredients. The London *Pharmacopœia* of 1667 published a formula for the preparation of a mithridate which called for eighty-five different ingredients. A recent example of polypharmacy is the still famous Warburg's tincture, which originally called for some twenty-odd simples for its preparation.

The first specific work on dental materia medica with which the writer is acquainted is the "*Pharmacie odontologique*" by Bunon, Paris, 1746. This treatise constitutes a chapter in the author's larger work: "*An Essay on the Diseases of the Teeth.*" Bunon divides the dental drugs into groups representing the vegetable, animal and mineral kingdoms and among the enumerated remedies we note: brain, marrow and hair of the hare; teeth of the lion, the viper and the elephant; bones of the sheep and the ox, excrements of the wild cat, human urine and milk, wool, fat, snails and numerous other unsavory substances.

Since the publication of Bunon's treatise quite an extensive literature on dental materia medica and therapeutics has appeared, which furnishes enough proof of the immense strides made, espe-

cially in the last decade, in this particular phase of dental science. The systematic investigation of the pharmacologic action of drugs was inaugurated by Buchheim in 1856 and which was so ably continued by his apt pupil, Schmiedeberg. A complete revolution in drug therapy resulted, which was made possible only by the complete elimination of empiricism and by utilizing the results obtained from experimental work on healthy and artificially diseased animals and, to some extent, on man. Aside from the above-named experimenters, such men as Magendie, Beaumont, Claude Bernard, B. W. Richardson, Crum Brown, Frazer, Binz, Liebreich, Lauder, Brunton, Filehne, Kobert, Ehrlich, Cushny, Abel, Heinz, Pawlow, and others too numerous to mention, have paved the way in the past or are still actively engaged in solving the intricate problem of drug action, and thereby have created a new branch in biological science known today as experimental therapy. Unfortunately, the dental profession has been slow in keeping pace with the progress made in general pharmacology, and as a consequence there is still much empiricism involved in the practice of dental medicine. Broadly speaking, there is no excuse for such laxity. The last decade offers ample proof of the immense effort which has been made to place dental therapeutics on a rational basis; yet many notions prevail in the minds of some practitioners regarding the action of certain remedies which are not in harmony with the modern conception of the physiologic action of drugs. The stereotyped prescriptions which are so often displayed in current dental literature, and the consequent practice of "making the disease fit the remedy," are much to blame for this pharmacologic idolatry.

The most serious question that has confronted conservative dentistry ever since its inception is that which is involved in the problem of establishing absolute sterility of an infected root-canal. Prior to the introduction of antiseptics by Lister in 1867, ancient delusions of miasma and contagions had taken possession of the mind of the oper-

ator. He looked for suppuration and if his pus was not of a *bonum et laudabile* kind, he would waste little time in treating the offending tooth; he usually removed it. If a suppurating pulp was present in a filled tooth and he wished to save the latter he would drill a small hole into the pulp chamber near the free margin of the gum to give ready vent to the accumulated secretions. Archigenes (130 A. D.) had introduced this operation and used a small trephine for the purpose. This same procedure was advocated as a new venture by Hüllihen in the middle of the last century.

Soon after Lister had inaugurated his epoch-making antiseptic era in surgery, dentistry adopted his methods for the treatment of infected root-canals in an empirical way by using creasote or phenol as advocated by Witzel in 1873. However, it was left to the master mind of the late W. D. Miller to lay the foundation of our present knowledge of a sepsis and antiseptics as related to operative dentistry through the publication of his work: "The Micro-organisms of the Human Mouth" (1890). Since then innumerable drugs and drug compounds have been recommended at various times for the treatment of infected root-canals. From a clinical point of view the cresol-formalin mixture as introduced by Gysi in 1899 has been very widely employed. The true criterion of the antiseptic principle as utilized in wound sterilization depends upon efficient bacteriologic activity combined with total absence of irritation. These requisites are not fulfilled by the cresol-formalin mixture; it causes necrosis of the periapical structures and rather predisposes the tissues to future infections. As a consequence it has been very largely discarded in favor of more suitable compounds among which at this moment dichloramin-T solution stands out most prominently.

#### PROPHYLAXIS.

A review of the more important events of the historical evolution of dental pathology and therapeutics would be quite incomplete without mentioning at

least the progress made in oral prophylaxis. Scientific medicine at the present time has selected as the keynote of investigation the prevention of disease in its broadest aspects. The specialized field of oral hygiene is primarily concerned with the preservation of the normal equilibrium of the oral cavity and its contents. In the mouth of most civilized races, the mucous membrane, on account of the present perverted methods of selecting, preparing and seasoning our foodstuffs, is found more or less always in a state of mild chronic inflammation, while the hard structures of the oral cavity, the teeth, are subjected to a process of molecular destruction known as dental caries, a disturbance which is distinctly allied in its chemical and bacteriological aspects to the general phenomena of putrefaction. The important question which primarily concerns the dental hygienist is not so much involved in the query of *how* does a tooth decay, but *why* does it decay? At present, we are reasonably safe in asserting that tooth decay is the product of a streptomyces. Predisposition of a tooth to carious destruction as a whole or in part is profoundly altered by certain preliminary intrinsic factors, *i.e.*, anomalies of position, outline, structure, etc. The maintenance of the physiologic equilibrium of the oral cavity depends upon a freely flowing saliva. Its important function consists in bringing about fermentative changes of the various types of polysaccharids into soluble sugars, in the mechanical washing away of accumulated food debris, and in the ability to biologically inhibit the virulence of pathogenic bacteria. The quantity of the secreted saliva is the sole factor which governs the environmental phenomena concerned in the production of tooth decay. The quantity and the quality of the secreted saliva depends upon the nature of the ingested foodstuffs and their density and manner of mastication.

On the other hand, the teeth themselves must offer the necessary resistance to environmental phenomena, *i.e.*, they must be perfectly calcified. Calcification in its final analysis depends upon proper



foodstuffs ingested by the parent for pre-natal purposes and by the offspring during infancy and early childhood. Failure of growth, of calcification and occurrence of certain diseases can be directly attributed to foodstuffs, which, while representing the requisite amount of calories in well-balanced proportions, *i.e.*, proteins, starches, fats, and organic and inorganic salts, are nevertheless inadequate in regard to certain indispensable elements connected with metabolic processes which have been only vaguely defined and are termed vitamins.

The historical development of pharmacology and therapeutics within the circumscribed field of dentistry in nowise differs from that observed in the other medical sciences. Superstition and mysticism are the fundamental factors which

governed their early inception. The rough accumulated data obtained by observation in due time produced a slow segregation of observed facts from alleged fancies, which found its final expression in empiricism. As a sequence of the introduction of definite methods of research, based upon proved facts as obtained in the various departments of biologic investigations, dentistry, the youngest of the medical specialties, is now recognized as one of the great groups of experimental sciences which, as a whole, constitutes the art of healing, and it is to be hoped that the rather remarkable achievements of the last seventy-five years will prove a healthy stimulus for its future development.

*Vivat, crescat, floreat!*

40TH AND SPRUCE STS.

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## The Evolution of Oral Surgery in the Past Seventy-five Years.

By TRUMAN W. BROPHY, M.D., D.D.S., LL.D., Sc.D., F.A.C.S., Chicago, Ill.

IN 1836, eleven years before the advent of the *Dental News Letter*, there was not a dental society or association in the United States. In 1839, the first dental college was organized. In 1846, the predecessor of the S. S. White Dental Manufacturing Company, under the name of Jones, White & McCurdy, was established. In 1847, the *Dental News Letter* began its existence, merging into the *DENTAL COSMOS* in 1860, occupying a vast and hitherto uncultivated field. The growth of dentistry has been in keeping with the enormous development of the industries of this great country.

Dentistry was lightly regarded by men of other professions, and oral surgery as a department of dental surgery was unknown. Reviewing the literature of the subject, little can be found aside from the reports of minor operations upon the teeth and gums. Major operations were scarcely mentioned. I am requested by the editor to review briefly the history of the development of oral surgery during the past seventy-five years.

Those of us who have been engaged in this field of activity are not unmindful of the attributes and achievements of men long antedating the period of time which I am to cover, among whom were Ambroise Paré, Robert Wooffendale, Le Monier, John Greenwood, Horace H. Hayden, John Hunter and others who were the pioneers in this department of surgery.

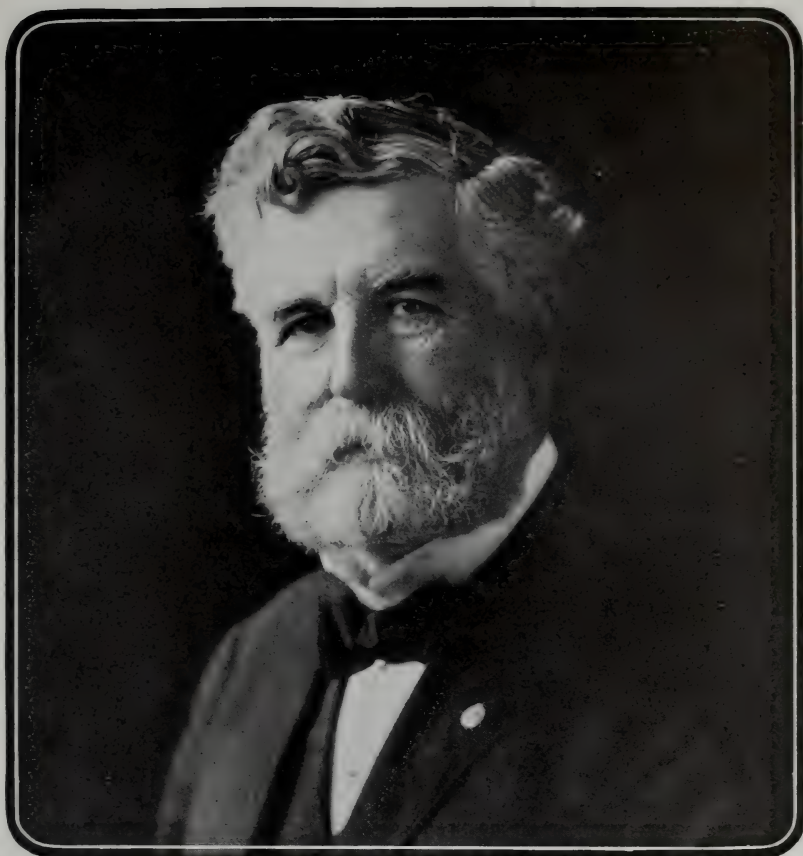
In the beginning, those who devoted themselves to the practice of dentistry were led by the necessities of their patients to perform operations upon parts associated with diseased teeth. By rea-

son of the skill which they acquired, they gathered about them patients whose maladies involved tissues not only within, but adjacent to, the oral cavity. These men, in some instances, succeeded admirably in serving their patients. In these early days many of them were not educated in medicine nor were they educated in dentistry. Dental training had not advanced far enough to include within its curriculum, to any very great extent, instruction in oral surgery. Many members of the dental profession, since 1840 to the present time, have engaged in performing certain minor surgical operations, such as removing carious bone, the excision of the apices of tooth-roots, etc., but such operations would not in themselves be of sufficient consequence to classify the operator as an oral surgeon.

A striking example of the persistency of a man whose ambition was to alleviate human suffering is furnished in the life of Dr. Simon P. Hullihen. This was furthered by procuring periodicals and works on medicine and surgery, which were his constant companions. No doubt his thoughts were first drawn to this subject by an accident which befell him in his youth. In his youth, he fell into a burning pit. Both his feet were so severely burned that he was confined to his bed for nearly two years. During this time he became devoted to the study of his injury and how best to overcome it, which led him gradually into the whole subject of surgery.

Early in life he showed great aptitude along the lines of surgery, and having shown skill in the extraction of troublesome teeth among his acquaintances,





*Truman W. Brophy*

TRUMAN W. BROPHY, D.D.S., M.D., LL.D., Sc.D., F.A.C.S., the author of the historical sketch of Oral Surgery, is Dean and Professor of Oral Surgery in the Chicago College of Dental Surgery, which institution he helped to organize in 1884.

Dr. Brophy has for nearly a half century been one of the leading exponents of oral surgery as a specialty of dentistry, and has been largely instrumental in bringing oral surgery to the forefront in America. His most conspicuous service to oral surgery is the "Brophy Operation" for cleft palate, recognized by all surgeons as a distinct advance in oral surgical procedure.

Dr. Brophy is held in highest esteem by his colleagues of Europe as well as America, and for many years has taken an active interest in the international aspect of dental education, having served for several years as a member of the Commission on Education of the International Dental Federation, and for the past four years has been president of that body.





soon had the reputation of being an expert. Many physicians in his community sent such patients to him. Among his early operations we have the record of a case of double hare-lip and cleft palate, in which he closed the lip, straightened the nose, and, by means of a gold plate, supplied a fairly good artificial palate. He was blessed with the gift of originality. The many new procedures which he devised and carried out with his marvelous mechanical ingenuity and manipulation, mark him as without a superior in his time in the field of surgery, particularly the oral phase. His degrees in medicine and dentistry were honorary, the former coming from the Medical Department of Washington College, Baltimore, and the latter being conferred by the Baltimore College of Dental Surgery in 1843.

I quote from Koch's "History of Dental Surgery" the following, to show the class and number of his operations during the last ten years of his life, also some of his contributions to literature:

He operated, for cataract, about 200 times; for hare-lip, about 100 times; for cleft palate, about 50 times; for cancers, about 150 times; for antrum cases, about 200 times; strabismus, about 100 times; making new noses, about 25 times; making new lips, about 50 times; making under jaws, about 10 times; general surgery (club-foot, etc.), about 200 times. Add these to a busy practice of a successful dentist practicing in all branches of his profession, and one can realize the great energy and usefulness of the man. Few have lived to accomplish as much in a greater number of years.

Amongst his essays were: "An Essay on Odontalgia" (1839); "Treatise on Hare-lip and Its Treatment" (1844); "An Essay on Cleft Palate and Its Treatment" (1845); "An Essay on Abscesses of the Jaws and Treatment" (1846); "Report of a Case of Elongation of the Upper Jaw with Distortion of the Face and Neck, Caused by a Burn, Successfully Treated" (1849); "Anesthesia," "An Essay on Abscessed Antrum," "Observations on Toothache," "Dental Neuralgia," and "Forceps."

His writings were excellent for clarity of expression and quality of thought. He said, "The dentist must carry up-

ward the standard of his profession and plant it upon the broad platform of medical science; he must claim for himself and his profession the same respect and importance awarded to other branches of the healing art, and that, too, upon the same ground—the ground of a thorough scientific education." These opinions are generally held by members of the profession today.

History records but one serious error made by Hullihen, who first proposed what was known as "Hullihen's Operation of Rhizodontrophy," first advocated in 1848 and published by him in the *Philadelphia Medical Examiner* in 1852. He penetrated the pulp cavity of a tooth by drilling into it at the edge of the gum to relieve the congestion and evacuate the infectious material. He then filled the cavity in the tooth, even though the pulp was exposed. He believed the necessity of destroying the pulp would thus be overcome. While this operation was at first quite widely adopted by dentists, it was soon abandoned because of unsatisfactory results. This is the only recorded method proposed by him which proved undesirable.

Considerable space has been devoted to the life and work of Dr. Hullihen, because I feel that a man who was crippled in his youth as was he, with very meager opportunities for education, and who by the force of his own will, assisted only by his mother, educated himself and won distinction not only as a dentist of rare skill but in the field of both general and oral surgery, becoming the foremost man of his time—is worthy of more than passing notice.

The surgeons of the world were awakened to the full realization of the remarkable attributes and achievements of the great father of oral surgery, James Edmund Garretson, who really was the first to impress upon the medical profession the importance of this branch of surgery. It was my good fortune to listen to the teachings of this distinguished man. He was born in Wilmington, Del., on October 16, 1828, and died October 26, 1895. As Samuel P. Gross of Philadelphia was recognized

and proclaimed as the father of American surgery, so was Garretson, also of Philadelphia, recognized and proclaimed the father of oral surgery.

His Wednesday afternoon clinics were attended not only by his own students, but students from all the other institutions of Philadelphia and adjacent cities took advantage of his wonderful teachings and skilful operations and occupied seats in the amphitheater. "It was through his efforts that a special branch of surgery was organized and recognized as 'oral surgery,' the first specialty evolved from dentistry, orthodontia being the second."

The magnetism of his personality was so alluring as to illumine the student's life and lead him onward and upward in his professional career. The explanation of his remarkable work, the unique position which he filled in the medical and dental professions was due to the fact that as an educated, highly skilled and practical dentist, he brought into the field of oral surgery a wealth of digital training, which stood him well in hand in the operations within the oral cavity which he performed with such consummate skill. Nor was this all. His broad culture, his wonderful vocabulary, his great gift as an orator, his accurate knowledge of anatomy and of dental pathology, together with an understanding of the broad, general principles of surgery and the rare privilege of associating with the most celebrated surgeons of his time, combined with his philosophy, made him a supremely useful man in alleviating a class of diseases which, prior to his efforts, were too frequently passed by.

He saw opportunity for vast improvement of the methods in vogue for operations upon the head, face, and jaws, and was able to apply his training in dental methods directly to these problems, thereby establishing an entirely new system of treatment, though ever conservative. One of his objects in operating was to avoid external mutilation of the features, and to attain this he was often able to remove the entire superior maxilla without external incision.

Again, he was careful to preserve all healthy tissue that might aid in restoration to normality within the field of operation. His dental training made him appreciate the possibilities of the dental engine in bone surgery, and he proved its worth by constantly using it in his work, including the delicate operations of brain surgery. Professor Garretson was the first and the foremost oral surgeon to point out and put into practice, more than any other surgeon, the importance of intra-oral operations, thus preventing facial mutilation.

Garretson's "System of Oral Surgery" remains as the permanent record of his surgical and literary achievements, and for many years was the only work of its kind in existence. It ran through five editions, from 1869 to 1890. It was not, however, by any means his only contribution to literature. He was a steady and consistent writer and a long list of separate publications might be added to the principal one, his book.

Norman W. Kingsley was born in Stockholm, N. Y., October 26, 1829, and died February 20, 1913. He began the study of dentistry in 1848, in the office of his uncle, A. W. Kingsley, who was a medical graduate. Dr. Kingsley's mechanical intuition stood him well in hand and made it possible for him to make far more than ordinary progress in prosthetic dentistry. The skill acquired from his instructor soon attracted the attention of the foremost men in the dental profession. He won a worldwide reputation as a most skilful dentist and a man of remarkable artistic skill, whose works have been favorably commented upon by the most exacting art critics. His masterpiece in the field of art was his marble bust of Christ, modeled in 1868 and pronounced by art critics the most excellent work of its kind. In the language of Dr. Kingsley, "Dr. Howard Crosby did me the honor to select it from all pictures, ancient or modern, to have a steel engraving made for the frontispiece of his 'Life of Christ.'"

Dr. Kingsley was honored at home and abroad for his achievements in prosthesis. He was proclaimed the father



of modern orthodontia. I would class him as the father of oral prosthesis. His treatise on "Oral Deformities as a Branch of Mechanical Surgery," published in 1880, is without a parallel in surgical literature. It remains the only standard work of its kind yet published.

His greatest achievement was in the field of prosthesis. There was a period in the practice of surgery when many of the most celebrated surgeons of the world reached the conclusion, that surgical efforts in the treatment of congenital or acquired cleft palate were so frequently unsuccessful that further efforts were useless and were therefore abandoned. As they had had opportunity to see the results of Kingsley's work in construction of artificial vela and obturators, they concluded that it was far better for the patient to wait until old enough to have such an appliance constructed, than to take the risk of operations which had so frequently resulted in failure.

In 1864, Dr. Kingsley visited Europe, carrying with him letters from such well-known surgeons as Valentine Mott, William Parker and Samuel D. Gross, who testified that "Dr. Kingsley had benefited cleft-palate patients more than surgery ever had." The Odontological Society of Great Britain and the London Medical and Surgical Society both received him most cordially. The *London Lancet* and the *Medical and Surgical Times* both eulogized the skill of Dr. Kingsley.

He was a man open to conviction. The broadness of his mind made it impossible for him to take a narrow view of methods of practice. When impressed with modern surgical methods in the treatment of congenital defects of the palate, he was an enthusiastic listener, and when demonstrations were made, showing him the advisability of operating in early childhood, with the correctness of speech which followed, he did not for a moment hesitate to "pronounce them excellent. The impression made upon the medical and dental professions and the laity by the life and work of Dr. Kingsley will remain a monument

to human endeavor in the interests of suffering humanity to the end of time.

Dr. Thomas Fillebrown, M.D., D.D.S., was born in Winthrop, Me., January 30, 1836, and died January 22, 1908. Dr. Fillebrown was a progressive man in his profession, and one of the earliest operators in oral surgery. His efforts were of a very high order. He was one of the first operators to set aside the prejudice which had grown out of the failure of surgeons generally in their efforts to operate successfully on cleft palate. His work in this special field, including hare-lip, was most commendable. His ingenious device for the administration and maintenance of anesthesia has been modified, and is still used by surgeons generally. It consists of a machine for vaporizing ether or chloroform by passing air through them. The vaporized anesthetic is conveyed to the patient through a tube, by either the nose or mouth, or, as often used by Dr. Fillebrown, the anesthetic was vaporized over the face. Dr. Fillebrown, in operating upon cleft palate, used small buttons on the palate, through which were passed wire sutures, with a view to preventing them from cutting out.

Among the senior oral surgeons still active in practice is Matthew H. Cryer, M.D., D.D.S., of Philadelphia. Dr. Cryer enjoyed unusual advantages as a young man in being the student and afterward first assistant to Dr. Jas. E. Garretson. The work which he has done as a cranial anatomist has won him renown throughout the world. It is doubtful whether any man, save only Prof. Arthur Keith of the Museum of the Royal College of Surgeons of London, has done so much work in cranial anatomy as has Dr. Cryer. His studies in this field rank him among the foremost men of our times. His investigations of the accessory sinuses of the nose impressed upon him that the frontal sinus communicates very frequently directly with the antrum of Highmore instead of with the nasal passage. Following his investigations, which were conducted with the greatest of care, the subject was considered by Schaeffer, who de-



clared that in 56 per cent. of all cases the frontal sinus communicated directly with the antrum. Dr. Cryer's accurate knowledge of the anatomy of the bones of the face and cranium has fitted him for the most delicate surgical operations in these regions. His work of correcting protrusion of the mandible by making the curved incision just anterior to the angle of the jaw was an original operation, and commends itself to every operating surgeon. His further operations in establishing normal occlusion of the teeth by removing a section of the jaw just at the angle is also most commendable. Among Cryer's most noted operations may be mentioned the principle of nerve section, advocated and practiced by his illustrious predecessor, Dr. Garretson, and the removal of tumors in and about the oral cavity. He is also a writer of renown, his best-known contribution to literature being his work on the "Anatomy of the Bones of the Face and Jaws."

John S. Marshall, M.D., formerly of Syracuse, N. Y., later of Chicago, and finally ranking dental officer of the United States Army, was educated as a physician. He became a student of dentistry under Dr. Amos Westcott, and practiced dentistry during his early career. He came to Chicago and was associated with Dr. W. W. Allport, with whom he remained until he entered the army. Dr. Marshall's interest in oral surgery increased with his years, until he devoted his time almost exclusively to this specialty. His practice was general in this field, directing his attention to the maladies common to the mouth and associated parts. His work on "Oral Surgery" was the second book of an exhaustive character on the subject, Garretson's being the first.

Thomas L. Gilmer, M.D., D.D.S., another of the active senior oral surgeons, was born February 19, 1849.

Among Dr. Gilmer's first papers were those published in the *Transactions* of the Illinois State Dental Society. The methods that he advocated have been among the most reliable known, and have been practiced by surgeons throughout

the world. The construction of interdental splints was very elaborately illustrated, and it was Gilmer who first proposed the wiring of the upper to the lower teeth so as to immobilize the broken fragments. Probably there is no method of retaining the fragments in quiet contact more effectually than this. It is also a procedure that may be employed by any surgeon without delay, and without the construction of complicated splints or other means of holding the parts in contact.

Dr. Gilmer has been a liberal contributor to dental and surgical literature, and has won a place among the most celebrated oral surgeons in America.

Vilray Papin Blair, M.D., of St. Louis, was born June 15, 1871. He was educated in medicine, and has devoted his professional life to the practice of surgery, giving special attention to the subject of oral surgery. Blair, like Cryer, has accomplished much in the way of treating prognathism. To him is due the credit for conceiving the first operation for shortening the mandible, correcting its protrusion and establishing a normal occlusion of the teeth. Much might be said on this subject, but the space allowed for this article will not permit of details.

Immediately the United States entered the world war, Blair offered his services and was accepted, becoming Senior Consultant in Maxillo-facial Surgery of the American Expeditionary Forces and Chief of the Section of Oral and Plastic Surgery for the United States. His services abroad were most exacting, but faithfully performed.

His writings are voluminous, including his book on "Surgery and Diseases of the Mouth and Jaws" and many papers, particularly on oral surgery. While his writings include almost every subject pertaining to oral surgery, his papers on maxillo-facial surgery claim the attention of all interested in this special subject. His work on congenital deformities is elaborate, especially on cleft palate and hare-lip.

Associated with Blair in the war work abroad were W. T. Coughlin of St. Louis,

who was his first assistant, Robert Ivy of Philadelphia, George Dorrance of Philadelphia, Justin Waugh of Hood River, Ore., George Schaeffer, Columbus, Ohio, and Herbert Potts of Chicago. These men accomplished much in reconstruction work about the face during their service. Much material of value, together with new ways of applying old principles, has been published as the result of their service.

Major A. C. Valadier, though a Frenchman, was a medical officer in the English army, in charge of the department of oral and plastic surgery in the Dublin Base Hospital No. 83 at Boulogne. It was my privilege and pleasure to be his guest in October 1918. My stay with him in this hospital was marked by a study of wounds of the face and head, ranging from the slightest to the most extreme. Major Valadier, assisted by Capt. H. Lawson Whale, developed not only the plastic and facial surgery department of this hospital, but the department of dentistry which was adjacent. Here dental operations were performed for the troops of the English army and German prisoners in the nearby camps. While I was in Boulogne, the battle of Cambrai raged, and wounded men were constantly coming in from the front to receive surgical care. Only those who have been witnesses of the incoming of these wounded soldiers can realize the tension under which a surgeon works, and the versatility which he must possess in order to meet the requirements in the great variety of cases presented for treatment. Dr. Valadier may well feel satisfied with the strenuous life he led in the performance of his duties in the surgical operating room during the war. Educated in dentistry, and having been a practitioner of dentistry and orthodontia, he was well qualified to construct any appliance or apparatus necessary to further his plastic work upon the face and mouth. The war demonstrated the fact that the construction of appliances for face and jaw surgery was essential as a framework for operations upon the face and jaws.

In reviewing the work of the surgeons of the war, no man is entitled to greater credit than Pierre Sebileau, the highly skilled, faithful, and untiring surgeon, who worked by night and by day in the Chaptel and Lariboisiere Hospitals in Paris. It was with him and in these hospitals that I spent the greater portion of my time in the latter part of the summer and autumn of 1918. In the great operating room at Chaptel Hospital were three operating tables, where work was being done almost continuously. In this hospital between five and six hundred cases, and often after a great battle a larger number, were brought for surgical care. It was not unusual for Professor Sebileau to begin work in the morning at seven o'clock and work through until eight, ten, or twelve at night. The wonderful powers of endurance of the man made it possible for him to continue this work to the end of the war and beyond. Realizing the importance of dental appliances for immobilizing fragments of bone, he early in the war consulted with Prof. Georges Villain, who co-operated with him in the application of appliances for this purpose.

Major H. D. Gillies, R.A.M.C., was the surgeon-in-chief of the department of oral and plastic surgery at Queen's Hospital, Sidcup, England, during the recent war. His work embraced some of the most remarkable facial restorations made during the war. He was one of the surgeons who soon realized, when the cases were coming in, the importance of having well-constructed dental splints and appliances for the retention of the fragments of bone in their proper positions, and recognized the fact that they were absolutely essential to successful surgical procedure. Major Gillies has now in preparation a work on war surgery, including that of the head, face, mouth, and jaws, which I have no doubt will be a classic in the field of oral surgery. Dr. Ferris N. Smith of Grand Rapids, Mich., was associated with Major Gillies in this work, as was also Capt. E. F. Rison of Toronto, Canada.

V. H. Kazanjian, D.D.S., was born in



Armenia in 1879, but in early manhood became an American citizen. He received his dental education in the Harvard University Dental School and studied, but did not graduate in, medicine at the Boston University School of Medicine. He was assistant and demonstrator of prosthetic dentistry at Harvard for several years. He entered the British Army in 1915, and until January 1919 served in the Royal Army Medical Corps with the rank of major, devoting his time exclusively to the treatment of face and jaw injuries, for which he organized a center at the 20th General Hospital, B. E. F., in France. Some of the most remarkable surgical operations in the field of facial and oral restorations made during the war are credited to Dr. Kazanjian. In recognition of his distinguished service he was decorated more than once by the British Government. He contributed generously to current literature during the war on the problems in the treatment of wounds of the face and jaws.

Henry S. Dunning, M.D., D.D.S., of New York, as an oral surgeon is especially distinguished in having treated a greater number of fractures of the jaw than any other operator in America. What he has accomplished in this field of surgery would make a volume of most valuable descriptive matter on this subject.

### **Notable Events in the Oral Surgical Field During the Last Seventy-five Years.**

#### **ANESTHESIA.**

One of the great, outstanding events which mark the progress of dentistry and surgery during the past seventy-five years is the discovery of anesthesia by Dr. Horace G. Wells in 1844.

Two years later, Dr. Wm. T. G. Morton, who had been a student of Dr. Wells in the years 1841-42, applied for and received a patent upon ether anesthesia.

Late in the year 1847, chloroform was introduced by J. Y. Simpson, M.D., of Edinburgh, Scotland. This agent for a

time became very popular, and was used in preference to either nitrous oxid or ether. Soon after the introduction of chloroform and the death of Dr. Wells, which occurred January 24, 1848, the use of nitrous oxid was largely discarded.

As early as 1855 an ether cone, similar in nearly all respects to the one in present use, was used for the administration of this agent. It was proposed by Prof. M. Collor.

In 1856, M. Ozanan employed carbonic acid gas and atmospheric air as a general anesthetic, with success. Insensibility occurred in two minutes. This agent was also used by Dr. Fenell in the same year as a local anesthetic in the removal of a toe-nail after the toe had been held for some time in a large-mouthed glass jar, filled with raw cotton upon which carbonic acid had been placed.

Hearing that a physician in Dublin, four or five years before, had produced anesthesia by the compression of the carotid arteries, Professor Pancoast in 1859 performed an experiment which closely coincides with the technique used at the present day for the ligation of the carotid arteries. After severing the tissues down into the sheath containing the common carotid, he passed a ligature around this artery just below the bifurcation, and upon tightening it produced immediate syncope in the patient. It is recorded that very soon after this, collateral circulation being established, the patient was restored to consciousness. Other experiments were made with a view to producing a state of anesthesia by compression of the carotid, but were finally abandoned.

In the year 1860, Richardson used chloroform as a local anesthetic by immersing the part in the agent. He claimed two failures in sixty cases.

Sulfite of soda was used in 1863 as a local anesthetic applicable particularly in cases of burns, allowing of their free dressing and cauterization without pain.

In 1867, I made the acquaintance of Edmund Andrews, M.D., of Chicago, a surgeon of great repute. He was an intimate friend of my preceptor. It



was about the period when nitrous oxid was introduced as an anesthetic for extraction of teeth. It was Dr. Andrews' custom to bring a bag, about four feet in diameter, to our office and fill it with gas from our gasometer, holding 180 gallons. It will be remembered that nitrous oxid had not then been compressed into a liquid. I had the great pleasure and privilege of often accompanying Andrews to the hospital and sometimes to private homes, and of administering the gas to his patients while he operated. In 1868, finding that nitrous oxid alone would produce cyanosis, Andrews concluded to combine oxygen gas with the nitrous oxid, which he administered, and found the combination produced a more satisfactory anesthesia, without danger of cyanosis. He was thus the first to use this combination of gases. Since that time nitrous oxid and oxygen gas has been extensively used as an anesthetic agent, and often as an inductive agent to ether anesthesia. Andrews was assisted in his work by Dr. Clover.

The comparative safety in the use of oxygen and nitrous oxid commends it to the operator. The transient state of anesthesia, except in the hands of an expert, has been to its disadvantage in prolonged surgical operations. There was a period in the history of nitrous oxid (from 1874 to 1900) when it was little used by general surgeons because of the difficulty in maintaining a state of prolonged anesthesia.

#### LOCAL ANESTHESIA.\*

During the past decade, local anesthesia has claimed the attention of progressive surgeons and dentists throughout the world. Among the first of these employed was cold, produced by various freezing mixtures, as the ether spray, the spray of rhigoline, ethylene chlorid, ethyl chlorid, ethyl bromid, etc. In

1855, electricity was used as a local anesthetic.

In 1845, F. Rynde of Edinburgh invented the first hypodermic syringe. In 1853, Alexander Wood invented one which was a forerunner of local anesthesia. It was a new method of producing anesthesia by injecting fluids into the field of operation. It seems that Wood, with his improved hypodermic syringe, endeavored to anesthetize the tissues with morphin. He reported many successful cases, but it is easily understood that it was not the local effect of the drug that rendered the operation painless, it was the general effect upon the system.

It was Kohler who introduced cocain to the profession in 1884. It was used in operations upon the eye, throat, larynx, etc. Wood's experimentation upon animals proved to be of great value in bringing out this agent. While it was used first largely by the ophthalmologists, it was later employed in all departments of surgery. This agent, however, was by no means free of objections. The toxic action of cocain and the reported number of deaths under its influence made it unpopular with many surgeons, so the laboratory workers earnestly sought an agent free from these drawbacks.

To Takamine is due the credit of isolating the suprarenin extract known as adrenalin. Adrenalin, combined with cocain, greatly improved the anesthetic.

Procain, or novocain, combined with adrenalin is now regarded the most efficient of the local anesthetics. In the hands of those skilled in its use, some of the most extensive operations can be successfully done without pain. It has been stated by some of the most enthusiastic operators that procain, or novocain, can be used more advantageously than cocain.

#### NEURALGIA.

The principal improvements in the treatment of neuralgia are nerve injections of osmic acid or alcohol. Latterly, alcohol has been used in preference to other fluids. The alcohol injection, pro-

\* The writer is indebted to Dr. Arthur E. Smith for information in regard to local anesthesia, and to Dr. W. V. Goodfellow and Dr. Matthew Lozier for assistance in compiling the statistics reported in this article.

viding the nerve is reached by the syringe point, will relieve pain for a period extending over several months and occasionally a greater length of time, but rarely can a recurrence of the pain be prevented. Alcohol always has a tendency to contract the soft parts with which it comes in contact. This probably is the case whenever it is injected into the nerve.

In many cases, in operations that I have made, I have found that the nerve at the point of entrance of the needle instead of being shrunken was greatly hypertrophied. When near a foramen or bony canal, the nerve would increase in size until the pressure upon the bone was followed by considerable hypertrophy. The pressure upon the nerve tissue by the hypertrophied bone was followed by extreme neuralgic pain. The removal of these branches of the nerves is attended with relief.

Previously, external incisions were made to expose the nerve and remove it. Today, operations for the removal of the second and third divisions of the fifth nerve are performed intra-orally. Exposure of the infra-orbital nerve may be easily made by lifting up the cheek, making an incision over the canine fossa, reflecting up the soft parts with a blunt instrument and seizing the nerve with a tenaculum. The branches to the cheek, lip, and nose may be dissected out, the nerve drawn out of the infra-orbital canal more than an inch, and cut off. The removal of the mandibular nerve is accomplished by making an incision over the mental foramen, lifting up the terminal branches as they emerge, then cutting down the foramen until the canal is exposed, following the canal a little distance when by means of a spiral drill and large broach with sharp barbs upon it, carried into the canal, the nerve is extracted.

#### THE SURGICAL ENGINE.

The surgical engine as an adjunct to the practice of dentistry is said to have been first manufactured and employed by John Greenwood, dentist to

George Washington. It was little used, however, until about 1870, when Dr. Bonwill of Philadelphia invented a most excellent machine, which was employed by many surgeons of the greatest repute. According to Cryer, an expert in the use of the surgical engine, having made many improvements in its construction, Harrison Allen of Philadelphia in 1876 was the first to employ it in surgery. The machine used by Allen was the Bonwill surgical engine. Since that time, many improvements have been made, and some of our most noted surgeons are now using it with the greatest of satisfaction. Cryer made many valuable improvements to meet the requirements of the surgeon in his operations. One objection formerly made to it was the difficulty in sterilizing the handpiece. The new construction has made this possible. In brain surgery, mastoid work, maxillary surgery, and in the surgery of the long bones, as shown by Albee of New York and others, the surgical engine is of inestimable value.

In a letter dated November 3, 1860, to Dr. Jonathan Taft, Isaac John Greenwood, D.D.S., a son of John Greenwood, the dentist who constructed artificial dentures for George Washington, stated, "My father was the first to use the foot drill. He made it himself from an old spinning-wheel of my grandmother's, and since his death I myself used the same one in my practice for twenty years, and have it now. I never had seen one before and I know the hand drill was always used before."\*

#### PROSTHESIS.

Aside from the great work of orthodontia, which contributes so much to the improvement of facial expression, prosthesis, in restoring parts congenitally absent or lost by trauma or disease, calls for ingenuity and an esthetic sense of the highest order. The knowledge and the skill of the orthodontist are of great assistance in the reconstruction work in the field of prosthesis.

\* Koch's "History of Dental Surgery."



My experience in the reconstruction hospitals in France impressed me that the skilled orthodontist was the one best qualified to take up and perfect the appliances necessary for the restoration of seriously disfigured faces from gunshot wounds. Happily, the war is over; the extensive wounds calling for maxillo-facial surgery have nearly all been successfully treated. The work in prosthesis, however, will be required until the last soldier suffering from facial wounds shall have passed away.

In the beginning of the war, the army surgeon regarded lightly the services of the dentist. Many would not admit that a soldier who had sustained the loss of the greater part of his mandible required the services of a dentist for the purpose of constructing an apparatus to immobilize the fragments and constructing a framework over which plastic operations might be made. Those of us who had an opportunity to observe the early facial operations of the war could not fail to recognize the shortcomings of the surgeon in restoring normal facial contour. Some of the most celebrated plastic surgeons of France were sadly disappointed in the results of their work when the wounds healed over collapsed chins, giving to the patients parrot-shaped faces.

It remained for men eminently qualified in prosthetic dentistry to construct and adjust appliances to hold the fragments in proper relation until they might unite, or in the event of the bone being lost, to construct artificial substitutes over which plastic work might be perfected. The great surgeon Seibeleau recognized the importance of the dentist's work and, in full co-operation with Dr. Georges Villain, a prosthetic dentist of worldwide fame, was among the first to bring about most satisfactory restoration of the face.

The war created a demand for the work of the prosthetic dentist heretofore unknown, and the services which he rendered impressed our Government with its importance, in consequence of which he was accorded a position side by side

with his medical *confrère* and on an equality with him. One needs only to read the story of the dental surgeon in the service of his country to fully comprehend its importance.

While making comparisons, we look back to the War of the Rebellion, and we find not a dental surgeon named, not even a man who could skillfully extract teeth. It is too well known to require a reminder, that the suffering of the troops, both North and South, was severe in the extreme. When the war with Spain was finished and the armies had returned home, the late Prof. Nicholas Senn, who was the chief operating surgeon in the field, said to me, "Dr. Brophy, you must do everything within your power to secure the appointment of dental surgeons in our army. The only service the soldiers had regarding diseased teeth was extraction by hospital stewards, many of whom were unskilled. The one great need, the greatest of all, during this war, was the services of skilled dental surgeons." I told him we would do our utmost to bring this about, and ere long a law was passed, providing for contract dental surgeons for the army.

During the late war, the office of the Surgeon-general of the army made the following classifications: An oral surgeon is one who has both medical and dental degrees. A dental oral surgeon is one who has the dental degree, with special knowledge of surgical procedures required to properly care for diseases of the teeth and supporting structures, fracture of the jaw, and the removal of impacted teeth, and special knowledge of interdental splints. The oral surgeon's field of operation includes the tissues above the clavicle and to the floor of the orbit.

It remained for Col. W. H. G. Logan to secure the passage of an act of Congress by which dentists were given equal rank and placed on an equal footing with physicians and surgeons in the army. Too much credit cannot be given Colonel Logan for his efforts in this respect. Much praise is also due him for

his efficient organization work as head of the department of dentistry in the United States Army during the war.

From 1898 to 1914, I visited each summer the representative surgeons and dentists of Europe. Through Martinier of Paris, I became acquainted with an appliance for the purpose of holding in correct occlusion the teeth of the mandible with the teeth of the maxillæ, following the removal of a large section of the body of the bone. It is well known that the traction of the muscles will, immediately after the loss of a portion of the body of the mandible, render the occlusion of the remaining teeth impossible unless an appliance is adjusted to overcome that traction. It consisted of two inclined planes secured tightly to the teeth by means of bands, the upper one sliding inside the lower. This arrangement prevents the mandible from being diverted to the lost side and maintains the proper occlusion of the teeth. In Berlin, Schroeder had a similar device, fixed to the teeth. Above was a slot, below was a bar which slid up and down in the slot. This prevented the teeth of the remaining fragment from being thrown out of proper occlusion.

Prior to the war, it was our practice to adjust a section of a rib to take the place of lost portions of the mandible. In some instances it was customary to adjust rubber in such a way that it would hold the bone in its proper position so that the face was not distorted; the symphysis was thereby held in the median line, and the facial contour was not impaired. These artificial substitutes were permitted to remain until cicatrization was complete, after which they were removed, when the teeth would be likely to occlude properly.

#### HEMORRHAGE.

In the early days, hemorrhage was not easily controlled. Cobwebs, spirits of wine, compression, creasote, cautery, and styptics were used. Today, hemorrhage is more easily controlled by hot applications, ligatures, adrenalin, blood sera, etc.

#### DISEASES OF THE TONGUE.

Diseases of the tongue, through the work of the great master, Henry T. Butlin, F.R.C.S., D.C.L., England, during the period between 1885 and his death, received most careful consideration regarding their pathology as well as the surgical measures essential to their best treatment. Mr. Butlin made diseases of the tongue his principal life-work, and his teachings and writings are regarded as highly authoritative on this subject. For want of space I cannot enter into details regarding the diseases and treatment employed, but will refer the reader to the "Treatise on Diseases of the Tongue" by Butlin and Spencer.

#### ANKYLOSIS.

The treatment of ankylosis of the jaw has been improved greatly in the last twenty-five years. Formerly, in true ankylosis, teeth were extracted to enable the patient to take his food, and little attention was paid to the immovable jaw. This was as early as 1848. In case of adhesions of the cheeks and false ankylosis, these were cut so as to enable the patient to open his mouth. In most cases, the ankylosis recurred.

John B. Murphy, in 1914, resorted to a method of flap interposition in two cases of ankylosis of the jaws. "The flap was removed, in one case from the hard and soft palate, and consisted of mucosa and submucosa. It was a pedicled, tongue-shaped flap, and it was swung outward so as to cover over the denuded, bony surface of the upper jaw which had been formed when the jaws were chiseled apart." The result was excellent. In the second case, the flaps were taken from the floor of the mouth, by the side of the tongue, and from the hard palate. The denuded areas healed nicely without scar formation.

In complete bony ankylosis of the temporo-mandibular articulation, the most reliable course to pursue is to make an artificial joint in the ramus of the jaw. An incision is made beneath the angle of the jaw, in the shadow line, and



the tissues reflected upward. With an engine bur, a crescent-shaped incision is made in the mandible, beginning at the distal surface of the third molar tooth, extending downward and backward. The bone is completely separated. The curved incision prevents the body of the bone from passing upward and backward at the point of separation. Once separated, a piece of gutta-percha, such as the dentist uses for base-plate, is warmed and placed between the ends of the bone and bent around them so that it cannot be easily displaced. This gutta-percha is 2 mm. thick, and capable of resisting great pressure. Therefore it serves the purpose of preventing the freshened ends of the bone from uniting. The wound is closed, leaving a small opening for drainage. The parts should be kept quiet, well drained, and clean. The gutta-percha is allowed to remain in place for six weeks, after which it should be removed. On examination of the ends of the bone, there will be found a membrane which is well organized, smooth, and serviceable in forming inter-articular tissue. The wound from which the gutta-percha has been removed should be closed, and the joint will be found to be permanent. I have never known of a recurrence of ankylosis following this operation. One of its great advantages is that the facial nerve is not disturbed and facial paralysis consequently will not follow.

#### ANTISEPSIS.

The presence of bacteria in the mouth was recognized generally in 1850, but no thought was given to their presence and the necessity of employing means to destroy them. Since this time, beginning with the great bacteriologists, means were addressed to the prevention of their growth. In cases of infection, remedies were sought to eliminate pathogenic bacteria from the wounds.

The war has impressed surgeons that wounds were generally infected, so that it is a safe practice to regard every open wound as infected. During the war all the standard antiseptics were tried out,

and many new ones evolved. The most potent known remedies are not adaptable to the treatment of the mucous membrane of the mouth. It remains for men engaged in research to elaborate some substance similar to the Dakin solution which can be used on the mucous membrane of the mouth, nose, and accessory sinuses.

#### RANULA.

The old treatment of ranula—of piercing the cyst with a silk thread, etc.—kept the tissues fresh so they united after the suture was removed. The best course to pursue in the treatment is to puncture the cystic wall in two places, making use of a silver tube about 3 mm. in size to form a ring about half an inch in diameter. This ring is then perforated with many holes throughout its entire circumference. One end is carried into one of the openings made and out of the other. The ends of the tube telescope each other and form a ring. This is allowed to remain several weeks. The opening within it admits the saliva from the interior of the cyst and the saliva passes outward, making its exit through the openings in the ring outside the cyst. This little device is of no special discomfort to the patient. It not only permits the exit of saliva, but it is smooth upon its outer surface, and the freshened tissues about it will soon become smooth and heal over with new membrane. Thus we establish a permanent orifice through which the saliva may escape. The tube should be rotated daily so as to prevent granulations from entering and obstructing the small openings. The ducts may be obstructed by salivary calculus, which would be revealed by the X-ray.

#### TRANSPLANTATION OF TISSUE.

In 1866, Hart successfully performed some interesting experiments in tissue grafting, including the grafting of the tail of a rat into another rat. Professor Hamilton also made use of skin-grafting successfully.

The war has demonstrated the feasibility of transplanting skin to replace cicatricial tissue in the mouth. The use of large flaps from neck, forehead, and chest to the face in the treatment of extensive shell wounds has proved most reliable and satisfactory. The tube pedicle so successfully used by Major Gillies of the English army has made it possible to transfer skin tissue almost any distance and keep it alive while union takes place.

As a surgical measure developed by experience in the war, it was found that the transplanting of bone was most successfully accomplished by using two subperiosteal flakes of bone, with the bony surfaces in contact. Prior to this, sections of rib and tibia were employed. The former are the better. Cartilage from the ribs and the ear are highly regarded for reconstruction of the nose.

#### THE ANTRUM OF HIGHMORE.

There is ample evidence in oral literature, since the year 1880, of the successful treatment of the diseases of the antrum of Highmore. Even though nothing was known of the nature of the infecting agents producing the purulent material which was often evacuated from this sinus, what might be considered very rational treatment at the present time was then instituted. Authentic cases are recorded of the extraction of teeth for the purpose of entering the maxillary antrum to give drainage to the impounded fluids. One case is cited of the collapse of the walls of the antrum, which was associated with a discharge of fluid. The appearance of the patient was as though the superior maxillary bone had been removed. No surgical work was done in this case, a spontaneous cure supervening.

The fact that alveolar abscesses could and do discharge their contents into the antrum seemed to be known at that time. No practical application of this fact was made except in rare instances. No doubt empyema of the antrum was often overlooked.

Reviewing the literature, it is appar-

ent that some early operators recognized empyema of the antrum, and treated the infection by drainage and irrigation, but they did not, nor does the medical profession yet recognize the prevalence of the disease. I am certain that infections of the antrum of Highmore at the present time occur far more frequently than is generally realized; that so-called nasal catarrh, dull, heavy pains in the face, and often copious flow of purulent secretions in the nose take place while the sufferer is unconscious of the origin of his trouble, and the catarrhal conditions are often treated by the rhinologist without a knowledge of their origin. In these days we recognize that the apices of tooth-roots often penetrate the antrum.

#### THE ROENTGEN RAY.

Since the advent of the roentgen ray, discovered in 1895 by William Konrad Roentgen, light has been thrown on many previously unrecognized conditions. With the knowledge imparted by it, we are able to diagnose and treat them successfully. Abscessed teeth, necrotic bone, excementosis, pulp nodules, impacted teeth, infections of the antrum, osseous tumors, jaw ankylosis, etc., are brought before the surgeon's vision, and he is enabled to address appropriate remedies intelligently. This apparatus is indispensable to the oral surgeon and the dentist. In war time it was extensively used in the search for foreign substances in the face, and it enabled the surgeon to decide what course to pursue in their removal.

#### CLEFT PALATE AND HARE-LIP.

Surgical procedures for the closure of the fissure in cases of congenital cleft palate were first used about the beginning of the nineteenth century. The unsatisfactory attempts of these early operators must have discouraged others from undertaking the difficulties of this intricate surgical operation. In the earlier years, the work of Dieffenbach, Langenbeck, Warren, and Agnew was regarded as the best in their time.



William Fergusson of Guy's Hospital, London, records a series of between three and four hundred cases, but all of his work seems to have been confined to repairing the tissues of the soft palate, the cleft in the hard palate being closed by an obturator. He also followed the practice of cutting off the protruding pre-maxillary bones. This practice has been objected to by a few, but obtains at the present day to a surprising extent. The resulting deformity is most hideous, and when one considers how accurately the alveolar arch may be built up by using the premaxillary bones as the keystone of the arch, after the vomer has been fractured or split, it is astonishing that any surgeon will follow the practice.

Between 1840 and 1862, few instances are recorded where an effort was made to close the cleft in the alveolar arch. Many cases are cited in which the hare-lip was repaired over this cleft, and in some the cheek tissue was raised to give enough relaxation to allow closure. Hullihen, however, made an effort to close such a cleft by the application of adhesive strips to the cheek, bound together by ligatures which were tightened daily. The alveolar cleft is perfectly repaired today by the use of silver wires and lead plates applied to the alveolar ridges on each side, and tightened to cause an approximation of the margins of the cleft, the foremost wires causing pressure in a posterior direction on the fragment that tends to override. Isolated instances are available to show that men were groping toward the present surgical technique used for closing the cleft in the hard palate, but depended in the main on the obturator.

Lane's operation, of raising flaps of soft tissue with which he constructs a membranous bridge for the cleft, is well known at the present time.

The use of the silver wires and lead plates for retention sutures, and the free separation of the soft tissues from the

bone will accomplish the results in all but those cases where much tissue has been lost from repeated unsuccessful operations. The results of the work of the most celebrated oral and plastic surgeons of the armies, especially the work of Major Gillies, convinces me that the use of the tube pedicle will make it possible to reconstruct any palate in healthy patients, no matter how much tissue has been lost by previous operations.

In the three-quarters of a century just closed, it has been satisfactorily shown that the best results in cleft-palate operations are secured by operating in early infancy.

In the light of modern investigation and practice, the methods pursued by early operators, of incising important muscles and excising the premaxillary bones, have been abandoned by the best operators. Any operation which destroys the function of the tissues operated on cannot be too strongly condemned. Every operation should be so performed that the parts will be left in as normal a condition anatomically as possible.

Reviewing the span of years which has been under consideration, the achievements of Pasteur, Lister, Koch, Virchow, and Billroth stand out as having produced the greatest advances in surgery—asepsis, antiseptic surgery and bacteriology. The advent of the roentgen ray marked another step forward. Skin and bone grafting, the transplantation of tissue and prosthesis have been developed during the war to a degree of highest efficiency. Laboratory analysis has come to be a most important adjunct in the treatment of surgical cases. Too, the recognition of acidosis and its successful treatment has contributed to a very great extent in saving life, especially when treatment is employed prior and subsequent to the administration of anesthetics.

81 E. MADISON ST.

## Seventy-five Years of Dental Education and Legislation in the United States.

By CHARLES R. TURNER, D.D.S., M.D., Philadelphia, Pa.

AS dental education in the United States has now passed its three-quarter century mark as an organized effort in dentistry, it may profit us to examine the development of this important activity of our profession from the vantage point of today, and to consider some of the influences which have served to determine its course to the present time. Unlike Athena, the goddess of arts and science, who tradition tells us sprang forth full panoplied from the cleft head of Zeus, dental science and art have made their way by the gradual process of evolution characteristic of all human movements. And dental education as the process by which is imparted the knowledge and skill designed to qualify the prospective dentist for his service to mankind, has necessarily advanced by the same slow process of progressive change. Like human character in the forming, its development has been influenced by myriad factors of good and evil with which it has come into contact; it has not made a simple direct advance, but its evolution has been affected by that complex of favorable and unfavorable influences which is the common lot of human endeavor.

It is not my intention, nor is there space, to discuss all the factors which have any bearing upon my topic, for the less important items are too numerous. Nor is it my purpose to present an historical narrative of this movement except so far as is necessary to develop my theme, for the early history of dental education in America has already been ably presented for our enlightenment, and the recent history is still fresh in our memory.

### THE RELATIONSHIP BETWEEN DENTISTRY AND MEDICINE.

No single group of factors has exerted so continuous an influence upon the life-history of dentistry and its educational efforts as those growing out of the varying conceptions of the relationship it should sustain to medicine. The historic refusal of the medical faculty of the University of Maryland to entertain favorably the proposal of Hayden and Harris determined that the first dental college should begin its existence as an individual effort, and not one allied with or a part of medical education. This has had a most profound effect upon the whole course of dental education, for it has caused it to develop as special education and not as a specialization out of the Mother Science. That this has been disadvantageous through the whole course of the dental educational movement to the inculcation of an adequate conception of general disease processes in the body, and the oral manifestations of the same, as well as the effect of purely oral disease upon the body, there can be no doubt. I take it for granted that at no time in the development of dental education has there been any other feeling than that it should train the dentist to appreciate not only the local significance of lesions of the mouth and teeth, but also their relationship to body health in general, but certain it is that the course taken by dentistry as a separate development was not the one best calculated to develop a good understanding of the latter. To the extent that the approach to these problems has been from the local viewpoint,





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Dr. Turner's contributions to the knowledge of the engineering problems involved in dental prosthesis, his studies of the mechanism of dental occlusion, both in its normal and abnormal aspects, and his studies of the etiological factors which lead to malocclusion of the dentures, have made him a leading authority in prosthetic dentistry.

As an educator Dr. Turner has brought to bear upon the problems of dental education the efficiency of a broadly educated mentality, which has enabled him to materially aid in placing dental educational methods upon a sound, scientific basis.





their wider significance has suffered. Dental educators have not been oblivious to the importance of this factor, for even in the very early days of the Baltimore College of Dental Surgery, Dr. Thos. E. Bond delivered lectures upon "Dental Medicine," in which he endeavored to acquaint his students with what was then known about these matters. In 1867 the Philadelphia Dental College instituted the first course in oral surgery, which, in addition to being the primal effort to organize and present the knowledge relating to surgery of the mouth and associated parts, necessarily also had the effect of broadening the conceptions of the relationship of oral to general medical science. It was at one time hoped that through this avenue a rapprochement with the medical profession might be effected, but as has been pointed out, dentistry was destined to embrace oral surgery and not oral surgery dentistry, as originally contemplated by Hayden.

Later the affiliation of schools of dentistry with those of medicine within universities and without had some effect in giving a better medical understanding to dentists, for it made generally for more comprehensive courses in anatomy, physiology, chemistry, and *materia medica*, as the first three of these were usually given concurrently to medical and dental students. While this undoubtedly gave a fuller conception of the normal structure and functions of the human body as a whole, it is questionable if it contributed greatly to an understanding of the general pathological relationships of the mouth and teeth. In view of our present knowledge of pathological processes, it may be said that the above-mentioned item was not one of great moment one way or another, for it was not until bacterio-pathology came into existence that the pathological relationships of the mouth were fully known and their significance realized. The work of Miller, published in the eighties, and following the work of Koch in the general field, not only really laid the foundation for our special dental pathology, but incontestably established the true relationship of disease

processes in the mouth with those in other parts of the body.

The findings of Miller were known to the profession for years before they made the impress upon general professional thought that they should have made. It may be fairly said that it was not until the radiograph came to make its unhappy disclosures, that any wide appreciation of the systemic dangers of bacterial invasion of the mouth tissues was attained by the profession at large. And it is further probable that Hunter's paper, "The Rôle of Sepsis and Antisepsis in Medicine," published in 1911, had an even greater influence in forcing a realization of the wide disregard of Miller's teachings. I do not wish to convey the idea that there were not many dentists who did have a full understanding of these matters, or that no colleges propagated this information, for such was not the case, and I am writing of the conditions in dentistry in general. Some of the institutions, especially those of higher learning, have kept pace with the foremost advancements in dentistry, while others have sadly lagged behind, but I believe it is a fair criticism of dental schools as a whole, even at the present time, to say that their efforts to impart a knowledge of general pathology are largely through a study of the special.

Opinion has from the beginning been varied as to the best means to attain the proper grounding of the dentist in these essential particulars. There have always been those who deplored the separation of dentistry from medicine, and its incorporation therein has been advocated at intervals since 1840. Arthur, Garretson, Allport, Talbot, and others have written and spoken widely in support of this idea. Some have believed in giving the dentist a complete medical education prior to his beginning the special dental instruction or subsequent thereto. In the eighties and nineties it was possible for a student to take the courses concurrently in some institutions, and a certain number of dentists became possessed of both qualifications. For some years past, however, this has not been possible because of the enlarged content of medical and dental curricula,

and now the courses can only be taken separately, requiring five, six, and even seven years to obtain the two degrees. This is now prohibitive economically for all but a selected few, and is done chiefly by those intending to practice the larger surgical pursuits related to dentistry.

It is not likely that either of these two courses will be the one taken by dentistry to bring about this desideratum. The latter is economically impossible, and with the immense expansion of the medical course and its present tendency to limit the preparation for the practice of its specialties more and more to the knowledge directly bearing thereon, it is certain that if a general medical course ever were the best means of preparing for dental instruction, this is not true at present.

The trend of dental education in the more advanced schools, especially those forming integral parts of universities, is to give the dental student in his first two years a thorough training in the fundamental sciences of anatomy, physiology, chemistry, bacteriology, pathology, and materia medica, similar to that now furnished to medical students, while in the last two years he devotes his time chiefly to the acquisition of the special dental instruction and training which qualify him to practice his profession. As was pointed out by Kirk in 1914, if a reorganization of the medical curriculum to provide for training in its specialties in a similar fashion shall occur, "then dentistry will be fully qualified and equipped to take its place and rank along with the sister specialties of the healing art."

The general subject of the relationship of medicine and dentistry must not be passed without a brief consideration of the effect which their separation has had upon the development of the special dental knowledge which we must remember is, after all, the chief object of dental education. There can be little doubt that greater opportunity has been afforded for the elaboration of mechanical processes and the attainment of manipulative skill which have made American dentistry justly famous. Furthermore, the contributions to the scientific knowl-

edge regarding our special field have been made largely by those who were in the profession, and were educated by it, and were thus in a position to understand the dental problems. As a notable example of this may be mentioned the establishment by Black of the necessity of laying down the margins of cavities to be filled upon surfaces of the teeth relatively immune to dental caries, a biological principle which, with the associated mechanical principles enunciated by him, has had more value in the operation of filling teeth than any other contribution to that subject.

#### THE INFLUENCE OF PROFESSIONAL THOUGHT AND PRACTICE UPON DENTAL EDUCATION: EMPIRICISM.

The influences which have been most potent in shaping the destiny of dental education are those originating within dentistry itself, which may therefore be characterized as intrinsic factors. The state of knowledge upon any subject must necessarily bear a direct relationship to what may be or is taught about that subject. In dentistry, involving as it does the element of skill as well as that of knowledge, the methods of practice in vogue in the profession must also find their reflex in the methods taught in the schools and *vice versa*. It is an evident truism that more cannot be taught of a subject than is known, but it is seldom true that all that is known of a subject is taught. It is but proper that new ideas or new theories must be subjected to the test of time or experience before they should be promulgated, for it is truth and only proved truth which can have value as educational pabulum.

When dental colleges were first established, dentistry consisted mainly in the cleaning and extracting of natural teeth, in treatment of inflamed or diseased gums, and in filling what would now be regarded as the simpler forms of cavities. Also in the mounting of artificial teeth upon gold and silver plates, in setting of pivot teeth, and in regulating the simpler cases of malarranged teeth. Extraction was the approved treatment for teeth with exposed or aching pulps, abscess of roots, or absorbed sockets. (Allport.)



Methods of practice were wholly empirical, and dental knowledge was derived largely from this source. Students were taught by the system of pupilage in which they learned the technical portion of their work by observing their preceptor, the remainder from work in his office.

The first dental curriculum was not designed to supplant but to supplement the practical instruction which the student received from his preceptor; to convey as much knowledge as possible, while the skill was to be acquired by actual practice with a dentist. Two courses of lectures extending over a period of three or four months each comprised the college course, while two, and in some cases three, years of pupilage were also necessary for graduation. Four or five years of practice were deemed equivalent to one college course. The same lectures were given each of the two years, and it was not until 1867 that a graded course was first introduced by the Ohio College of Dental Surgery. Harvard instituted a graded course of two years in 1876, with one year additional of preceptorial instruction as a requisite for graduation, the session being lengthened to nine months. Five years of practice as equivalent to one college course was discontinued by the New York College of Dentistry in 1876, but was not generally abandoned until the newly organized National Association of Dental Faculties in 1884 took action to discontinue it among the colleges of its membership. The three years' course was first instituted at the University of Michigan in 1889-90, and generally among the colleges of the Faculties Association in 1891-92.

#### THE DEVELOPMENT OF DENTISTRY ALONG MECHANICAL LINES.

At the time when the first dental school began its work, the mechanical operations through which dental service is rendered dominated professional thought. As more was known about these matters than about what may be called the vital relationships of dental operations, and as mechanical skill was

necessary to the actual practice of dentistry, it is not surprising that mechanical training should have taken so large a part in dental education. As this was the greater part of the course, it is natural that it should have become its most important part, and that dentistry should come to be regarded very generally from a mechanical point of view. Furthermore, as the empirical method prevailed very largely even in medicine, it is not difficult to understand how dentistry, consisting as it did of methods of practice learned by experience, should have followed similar methods in its educational efforts.

A brief glance at the literature from 1850 to 1875 reveals the fact that the chief contributions to dental knowledge and practice were of a mechanical nature. The introduction of cohesive gold in 1855, of vulcanite in the same year, of the rubber dam in 1864, and the Morrison dental engine in 1870, are familiar to all as incidents profoundly affecting methods of practice. The most prominent dentists were those whose reputation was based upon manual dexterity; in fact, after the introduction of vulcanite in addition to other objections urged against it, its use was decried because it tended toward a decadence of mechanical art.

The impetus of this development of mechanical ideals was so great that it has extended even to the present day. These mechanical ideals underwent great elaboration from 1875 to 1890, for during this period crown and bridge work entered upon a period of rapid growth.

The evolution of orthodontia during this period was also distinguished by the infinite variety of mechanical appliances which its votaries produced. This may be truly said to have been the mechanical age in dental education, and the early empiricism was continued by the fascination of the study of mechanical arts.

#### THE DEVELOPMENT OF THE SCIENTIFIC PHASE OF DENTISTRY.

The advent of what some have been pleased to term the era of scientific



rationalism in dentistry, in which disease processes and their effects are studied in the light of their cause in order that a rational remedy may be applied, has been attended with the greatest development in both the science and art of the profession. The old points of view have been difficult to displace, the new methods of thought difficult to establish. But the intellectual world had come under the spell of the accuracy of scientific observation and the impregnable truths of scientific deduction, and dentistry has widely appropriated the methods for its use. While the transition has not yet entirely taken place, the application of this intellectual method has already contributed far more to the development of dentistry than any other factor in its history. The discoveries in bacteriology have been utilized in the development of dental as well as general pathology, and the whole of the former may be said to really date from the later eighties. Therapeutics, a science wholly empirical, was revolutionized by the new learning, and operative procedures as remedial and preventive measures have been modified to a rational basis as the result of a better understanding of the causes of the diseases which they are invoked to treat.

Even purely mechanical problems have come to be settled upon a rationalistic rather than an empirical basis. The retention and resistance forms of cavities are determined by a consideration of the character of the stress devolving upon the fillings when inserted. Proper engineering principles have been found to underlie the construction of crowns and bridges. A more intelligent conception of mechanical dentistry has transformed it into dental prosthesis, and it has been realized that the mechanical operations involved are not the end itself, but only one of the several means involved in attaining the end. It is natural that dental prosthesis should long have served as a stronghold of conservatism, and that is historically correct. The work of Bonwill published in 1878, the first really scientific effort in artificial tooth articulation, remained almost unnoticed for nearly twenty

years, but now dental prosthesis in its various divisions has received a great impetus from the adoption of the scientific method, and has made most gratifying progress in the last ten years. So far from sounding the death knell of mechanics, as the empirics were wont to consider the ascendancy of wide scientific study of courses and principles to mean, this had already meant better mechanics than ever, and in its further application to the problems of crown and bridge work, whose pathological relationships now perplex the profession, it will certainly create the demand for greater mechanical skill in order to avoid the untoward consequence of some of our present modes of crown and bridge practice.

Having dealt at some length with the substance of dental education as represented by the sum total of professional knowledge, I now propose to examine the educative process in which this material is utilized, for dental educational methods and policies have been subjected to many influences developed within the activity itself.

#### INTERNAL INFLUENCE UPON THE EVOLUTION OF DENTAL EDUCATION.

From the time of the initiation of the first course, it was natural to expect that the organization and systematizing of the subjects of the curriculum would gradually result in its improvement. Beyond this general tendency which was manifest in the schools, no item worthy of special mention may be noted until 1867, when the courses in the colleges were first graded to extend over two years, instead of being merely annual repetitions. Dissection and laboratory instruction in chemistry did not make their appearance very early among the college facilities, and it was not until 1871 that laboratory methods were applied to anatomy, physiology, chemistry, and surgery in the Harvard Dental School. An association of dental schools for adopting a uniform standard for graduation and for mutual betterment was effected in 1884 in the organization of the National Association of Dental Faculties, the influence of which has

been far-reaching in advancing educational standards.

At its first meeting this body abrogated the prevailing custom of allowing five years' practice to be substituted for one session of college work, recommended the general adoption of a graded curriculum of two years, recommended the subjects of instruction, and declared itself in favor of an examination upon the rudiments of an "English education" for all candidates for admission. In 1889 a three years' course of not less than five months each was adopted, to go into effect in 1891-92. Six months' sessions were approved in 1894, and extended to seven months in 1899-1900. In 1901 a four years' course was projected for 1904-5 to accommodate the rapidly increasing subjects, but in 1904 this was rescinded in favor of a three sessions' course of thirty weeks each, as it was decided that the adoption of a four years' course had been a little premature. The four years' course went into effect in all the colleges of the country in 1917.

The National Association of Dental Faculties advanced the preliminary educational requirement to admission to a high school in 1897, and to admission to the third year of high school in 1900. In 1907-8, three years of high school were required and now for several years past, a completed high-school course or its equivalent has been necessary for admission to dental colleges. Thus will be seen the influence of this association in lengthening the dental course and in prescribing preliminary educational standards.

Having been organized with ten members, it rapidly grew to include all the reputable schools in existence, and new schools were admitted after they had attained an established status. In 1908, forty-three schools were upon its membership roll. Members of the association are required to maintain the standards prescribed for education, and in this way the weaker schools are encouraged to improve their methods in order to gain admission, and, after becoming members, to maintain acceptable standards. This resulted in establishing a criterion of

reputability which has been generally recognized by examining boards, and has even been approved by statute in some of the states. It has had a most beneficent influence upon some of the schools which exist as private educational institutions established for private gain, and not imbued with the highest educational ideals. At one time the natural increase in dental schools was greatly augmented by the springing up of proprietary schools. The requirement of a college diploma as a prerequisite to the licensing examination undoubtedly had much to do with this expansion of colleges, and it was natural that commercial ideals should find their way into educational institutions. Many came into being with the chief thought of making money, and even bogus diploma mills sprang up. Others have had no such sordid aims, but have had aspirations of the highest. One private institution, the Pennsylvania College of Dental Surgery, voluntarily gave up its charter in 1909 because, with the rapidly increasing cost of delivering dental education, it was unwilling to abate its traditional standards of high excellence even to maintain its existence.

The National Association of Dental Faculties had of necessity to develop very definite police powers over its membership in order to keep some of the proprietary schools in line, and the necessity for these powers seems to exist to the present day. Unfortunately, this method of government began to conflict with the ideals of free development of the schools connected with universities. Police methods are so inconsistent with the university idea that in 1909 an association of university schools was formed among those who had previously withdrawn from the older body.

#### EFFECT OF UNIVERSITY AFFILIATION.

The establishment of a dental school in connection with Harvard College marked a real epoch in dental education. The universities were traditionally associated with instruction in the four faculties of arts, medicine, law and philosophy, and have been very conservative toward the newer departments of human



learning. Thus dentistry, in common with technical education and other more recent fields of inquiry, had developed largely outside of university affiliation. But no intrinsic reason exists for this, as dental knowledge is not isolated or peculiar, but has a kinship with other elements of our intellectual commonwealth, and the formal recognition of this by Harvard has been the first step in a movement of inestimable value in dental education. In 1875, Michigan established a dental school, in 1878, Pennsylvania, and now there are a dozen or more dental departments which are integral parts of state or endowed universities.

The value of the university relationship cannot be gainsaid. Its influence in the establishment of high ideals for the professional career, in the development of professional character, and in imparting a broad outlook upon professional life is of the greatest value to the student. Its freedom to develop its educational policy untrammelled by financial restrictions, its opportunities for wide collateral contacts for its teachers and its intellectual stimulus cannot fail to be of advantage to its faculty. That the future of dental education in this country lies in its development in the universities, there is great evidence to support.

The science of pedagogy, which has of late years undergone such a rapid development, did not exist when dental schools were originated, but within the last thirty years it is possible to note a marked improvement in the methods of instruction in vogue in dental schools. Laboratory instruction in mechanical dentistry survived from the preceptorial age, but it was not applied to operative dentistry until 1888-89, when it was first introduced by the Chicago College of Dental Surgery after a paper upon the subject had been presented by Black to the Odontological Society of Chicago in June 1888. The idea gained rapidly in popularity, and in 1893 the National School of Dental Technics was organized among dental teachers to promote technic instruction in operative and mechanical dentistry. By 1898, the activities of the organization had enlarged so that

pedagogical methods in general formed the subject of its discussions and its name was changed to the Institute of Dental Pedagogics, and later, to the Institute of Dental Teachers to indicate its wider sphere of usefulness.

The elaboration of technic instruction in dentistry has had a twofold effect upon students—the education of their hands to perform the highly specialized mechanical work required, and, through the training of the hands, the education of the brain. It is but a special application of the manual training methods so much used in our secondary school system. This is but one of the pedagogical principles which have been applied to dental education through the instrumentality of this association.

#### PRELIMINARY EDUCATIONAL QUALIFICATIONS.

A final item affecting dental education from within is the matter of adequate preparation for its pursuit. It is self-evident that sufficient intellectual training to comprehend the subjects of the curriculum is necessary for any instruction. The importance of this has made it the subject of regulation by both Faculties Associations, and it is now also a statutory requirement for the licensing examination in all states. It is perfectly obvious that with the elaboration of the dental course, it has become progressively necessary to place a broader preparation under it. In spite of the increase to the requirement of a high-school course, dental educators realize the inadequacy of this except as a step in the ultimate attainment of adequate preliminary qualification. In some schools deficiencies in the basic science work and even in English have been made up by instituting courses in these subjects, but as this obviously takes time which should legitimately be given to the professional studies, and as it can be but a temporary makeshift, it is not the correct solution of the matter. The announced requirement in 1921 of a college year's work in the sciences and English as preliminary to the admission to schools by the Dental Faculties Association of American Universities is a further constructive step, which must



logically in time be followed by two years of college work, which is now the present requirement for the study of medicine.

Dental periodical literature as a vehicle for publication of knowledge, and through its editorial pages for the advocacy of professional reforms and advancement, may also be mentioned as one of the extrinsic forces serving the cause of dental education. Standard dental literature, useful for textbooks and as works of reference, of course constitutes one of the chief agents for the imparting of learning, and dental societies have also some place among the factors which have directed dentistry along its educational pathway. I must conclude my analysis by a reference to the influence of dental legislation upon the profession and its educational activities.

### Dental Legislation.

It is rather interesting to note that the first record of any dental law is found in the first edition (1720) of "*Le Chirurgien Dentiste*," by Pierre Fauchard.\* In writing of the general abandonment of the treatment of dental diseases by surgeons he says:

The most celebrated surgeons having abandoned this part of the art, or for lack of opportunity having cultivated it but little, their neglect has been the reason that some persons without theory and without experience have undertaken it, practicing it at hazard, without principles and without method. It has not been long since in the city of Paris that they have opened their eyes to this abuse; they have, therefore, decided to submit a slight examination to those who are intending to treat these maladies, after which they take the title of Expert for the Teeth: although many among them are not equipped with a knowledge above the mediocre.

This doubtless grew out of the guild laws of the time.

#### THE FIRST STATE LAW REGULATING THE PRACTICE OF DENTISTRY.

The first statute regulating the practice of dentistry in the United States

\* I am indebted to Dr. Edward C. Kirk for this reference.

was passed in Alabama in 1841, in which provision was made for the issuing of license for legal practice after an examination of the candidate by the state board of medicine, enlarged by the appointment of a "professional dentist." Provision is made for the punishment of violations of the act, for the registration of the license, for the recognition of a diploma, "from any regularly constituted institution in the United States." This was the first of many of the so-called "prohibitory laws" designed to prohibit the practice of dentistry by unqualified persons.

New York followed in 1868 with a statute incorporating "The Dental Society of the State of New York," to the censors of which was intrusted the examination for license. This statute was of a constructive character, and was designed to elevate the standards of dentists by creating a distinction between the qualified and the unqualified. The spirit of this law still remains, but its details have been greatly changed since the original enactment.

Prohibitory laws followed in Ohio, Georgia, New Jersey, and Pennsylvania in the order named from 1868 to 1876. The preamble to each of the last three mentioned statutes declares that it is "An act to regulate the practice of dentistry and to protect the people from empiricism in relation thereto in the State of . . . ."

The theory of dental legislation is that such laws are passed under the police power of the state, whereby it is enabled to enact measures for the preservation of the general welfare of its inhabitants, and to prohibit acts which are detrimental to the health or morals of members of the community. It thus has the right to prescribe the qualifications for the legal practice of any calling which, like dentistry, has to do with the health and physical welfare of persons.

All the states of the Union now have statutes governing the practice of dentistry, and the constitutionality of such acts has been attested by the Supreme Court of both individual states and of the United States.

At first an examination on profes-

sional subjects was the test of qualification. In some states a diploma from a dental school was sufficient, and exempted the applicant from the examination. Later, examinations were required of all applicants, and still later, a diploma from a reputable college was required to establish eligibility for the examination. This is the statute at present in almost all states. The possession of a certain preliminary education is now also required in all states, though its character varies among them.

The examiners are usually dentists who have been in practice for a specified term of years, who are appointed by the governor from a group nominated by the state dental society. Their authority to determine the qualification of applicants is final within the specified provisions of the law, unless malfeasance in office or that their action is influenced by malice can be shown. It is much to be regretted that a provision inserted in the Pennsylvania law in 1907 bearing on this point is not incorporated in all statutes regulating professional practice. This provision requires that all examinations be held in writing, and that all questions and the answers thereto by all the candidates shall be placed on file by the Dental Council in the State Capitol, and shall become matters of public record and freely accessible to the parties at interest for a period of five years. This gives the candidate the protection against any possible star chamber proceedings which publicity affords, and likewise an equal protection to the examiners against unjust accusations of discrimination.

While the requirements for practice are nominally the same in all states, the statutes differ somewhat, and a reciprocal interchange of license is in existence in but few instances. It is interesting to note that in 1910 Virginia passed an act requiring the medical qualification in addition to the dental of all persons applying for license to practice dentistry in 1914, but in this latter year it was repealed, because it was not in accord with the consensus of general opinion upon the subject.

In New York State, where all matters

of education are under the jurisdiction of the Regents of the University of the State of New York, an interesting situation exists in regard to professional education. The qualifications for practice are defined by statute, but the details of an acceptable dental course and of an acceptable preparation therefor are within the powers of the Regents to determine. Legislative power in these particulars is thus delegated to an administrative body, and there is no doubt that this has its serious drawbacks. The constructive work carried on by the Board of Regents in dental education has raised the standards above those which have been deemed practicable by the foremost educators in the dental field.

New York has a splendid statute in regard to the prosecution of the illegal practitioner, and is the first state to deal with the problems presented in the advertising of superior professional skill.

The latest dental legislation relates to the legalizing of the dental hygienist, or women trained to remove stains and accretions from the exposed surfaces of the teeth, but not permitted to perform any other operations upon the mouth or teeth. The Connecticut Dental Law was amended to go into effect July 1, 1917, and contained the first provision for the practice of dental hygienists. Similar statutes have been enacted since that time, so that the practice has become legalized in some fourteen states.

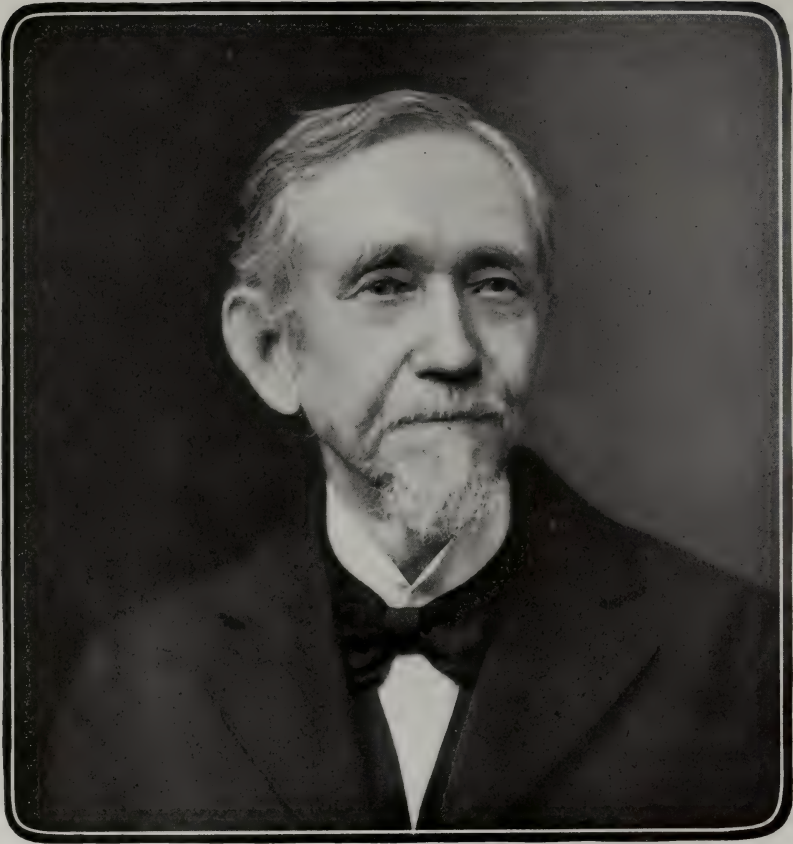
The influence of this upon public health programs in oral hygiene is immeasurable, as it provides a means not only for the dissemination of knowledge upon the subject but for the institution of actual prophylactic treatment.

Dental legislation proper does not have to do with defining the relations of the patient and dentist, nor of the dentist to the state, as these are included in the provisions of the general laws.

It appears, therefore, that it has to do very largely with a determination of the qualifications for practice and therefore it will always sustain an intimate relationship to dental education.







*William H. Trueman.*

WILLIAM H. TRUEMAN, D.D.S., is particularly well fitted to write upon the historical aspect of Dental Literature, as he has been a close student of the development of dentistry during almost its entire history in America.

He has been an indefatigable collector of dental books and periodicals and is the possessor of one of the most valuable dental libraries in existence, containing many rare volumes that could not at this date be duplicated.

Dr. Trueman's researches in the field of dental history have been the subject of frequent contributions to dental literature, one of his most notable efforts being the article on "Dental Journals in America," in Koch's "History of Dentistry."



# The History of Dental Journalism in the United States.

By WILLIAM H. TRUEMAN, D.D.S., Philadelphia, Pa.

IT was fortunate that dental journalism made its advent in the United States, for nowhere else in the entire world were conditions so favorable. Although American educational institutions had not reached as high a standard as had those of longer settled communities, nevertheless, a well-ordered public-school system, reaching every city, village and hamlet in the country, made education far more general. Wealth was more evenly distributed than in the older countries. The people were prosperous, the political atmosphere stimulated ambition, and untrammelled by ancient customs and traditions they developed a progressive spirit that welcomed promising betterments.

So far as practical manipulations are concerned, American dentists were far more advanced than were their compeers in other lands. When, however, in the late thirties of the last century, a few of the more progressive members of the profession began a "stock-taking" of attainments and needs, it developed that in scientific attainments and literature the outlook was not so satisfactory.

From the beginning of the century (1800) to 1839, although a number of works concerning the teeth had been written by American dentists, only two reached the standard of textbooks: the first, by Samuel S. Fitch, the first edition appearing in 1829, and a second in 1835; and a work by Chapin A. Harris, entitled "The Dental Art, a Practical Treatise on Dental Surgery," 1839; the forerunner of a long list of new editions and revisions which from that day to this have proved acceptable dental textbooks. Great Britain during this period did much better. The works

by Robert Blake, Joseph Fox, Leonard Koecker (although his reputation as a practitioner had been made in the United States, his dental works were written and published after his removal to London), Thomas Bell, David W. Jobson, and Alexander Nasmyth, were notable additions to the literature of Dental Science. In France, the works of Duval, Laforgue, Gariot, Baumes, Delabarre, F. Maury, Blandin and Desirabode, well maintained the reputation of French dental literature established from the time of Fauchard.

Foremost in this movement for professional advancement we note Horace H. Hayden, well known for his professional and scientific attainments, and Chapin A. Harris of Baltimore aided and encouraged by a number of well-known dentists of New York, and other progressive members of the profession scattered throughout the country. As a result of their work, the *American Journal of Dental Science* made its advent June 1839; the American Society of Dental Surgeons was organized at New York, August 1840; and the Baltimore College of Dental Surgery opened its doors November the same year. The good effects of this trinity of innovations were quickly seen.

## THE AMERICAN JOURNAL OF DENTAL SCIENCE.

The journal, edited and published under the auspices of the American Society of Dental Surgeons by a committee of busy dentists appointed for that duty, who were new to the work, suffered as all like enterprises have since done, however commendable the effort, from the lack of trained business men

to manage the important commercial end. Talent and enthusiasm, push and energy, are needed to produce a professional journal and make it acceptable to readers for whom it is intended. That, however, is only the beginning of the problem of how to make it a real success. Unless this is followed by business talent, enterprise and opportunity to bring it to the intended reader's notice, and secure his helpful interest in it—failure is sure. Keeping this first dental journal going was uphill work from start to finish, notwithstanding that its twenty volumes will ever stand as an excellent example of professional journalism.

The liberality of its members enabled the society to complete the first ten volumes. As a literary production it was a decided success. It had accomplished the purpose of its founders in so far as it had brought members of the profession together, and had proved a medium through which they became helpful to one another by publishing many items of professional interest. It brought to the fore many dental writers who otherwise would have remained unknown, and thereby established a department of dental literature which more than anything else has lifted dentistry from a mere avocation to the dignity of a recognized profession. At the close of this volume it was relinquished by the society, having become a financial burden, and became the property of Dr. Chapin A. Harris, who continued its publication as a second series until his death, Saturday, September 29, 1860. With the last number of the tenth volume of this series, October 1860, it was discontinued. In this connection there is food for thought in Dr. Harris' editorial announcing the close of the tenth volume, and his editorial announcing that it would be continued as a second series under his ownership.\* In these he recounts the financial difficulties encountered by the projectors of the first dental journal.

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\* (See *American Journal of Dental Science*, vol. 10, July 1850, page 309, and vol. 1, New Series, October 1850, page 97.)

#### STOCKTON'S DENTAL INTELLIGENCER.

The second American dental journal, *Stockton's Dental Intelligencer*, began September 1, 1843. It was published in Philadelphia by Samuel Wesley Stockton, the first in this country to cater commercially to the needs of the dental profession. It was short-lived, ending its career at the close of the fourth volume, November 1848.

September 1846, the *New York Recorder*, made its appearance, published and edited by J. S. Ware, M.D. It was well edited, and contained a number of items of dental interest that may today be read with profit. After several changes it passed into the hands of Sutton and Raynor, dental dealers, New York. Its career ended with the tenth volume, February 28, 1857.

#### THE DENTAL REGISTER.

October 1847 saw the advent of two dental journals that, with but slight changes, have without intermission continued to the present day. The *Dental Register of the West*, and the *Dental News Letter*, continued since August 1859 as the DENTAL COSMOS. The *Dental Register* originated with, and was at first published under the auspices of the Mississippi Valley Association of Dental Surgeons, and was edited by Dr. James Taylor of Cincinnati, Ohio. This association was for many years quite active in pushing forward professional affairs in the middle West. It was the first dental society that lived to celebrate its fiftieth anniversary, disbanding shortly thereafter. This journal was octavo in size, published quarterly until July 1859, and since then it has appeared monthly. It has undergone a number of changes of editorship and ownership in its career.

#### THE DENTAL NEWS LETTER.

The first number of the *Dental News Letter* appeared October 1847. It was an octavo of sixteen pages, published by the firm of Jones, White and Company, dealers in dentists' supplies, 273 Race



St. (old number), one door above Eighth Street, Philadelphia. It was a quarterly, subscription fifty cents a year. The object of its publication is set forth in the following announcement on page seven of the first number:

Our object in publishing the *News Letter* is, first: that the profession, both in the United States and Europe, may be informed of the improvements which have been and are now being made in the manufacture of artificial teeth; the various tools and aids in the workshop, and instruments for the operating room; second: to bring before the profession all that is new in the theory and practice of dentistry, through the medium of original communications, essays from old and young practitioners, collations from authors, and items of news on all subjects relating to dentistry.

While no editor is named on the title page, Mr. John R. McCurdy, a member of the firm, made the journal his special care, a task for which he was well qualified. He was the business manager of the firm, and by association and correspondence well known to the profession at home and abroad; he was keenly interested in all that tended to professional advancement, and possessed a fair share of literary ability.

The first article is a communication relating to the administration of sulfuric ether, by J. F. B. Flagg, probably the first to discover and make known that Morton's mysterious "letho" was the well-known sulfuric ether, and one of the first in Philadelphia to make its administration in dental and surgical practice a specialty. Next is a report of a case of "Cancrum Oris" by C. A. Peck, dentist, of Norristown, Pa. Then a communication on the "Effects of Mercury on the Teeth." This is followed by a report of the proceedings of the Pennsylvania Association of Dental Surgeons, then just entering its third year. A page is taken up by small items; nearly all of the rest are occupied with advertisements of the firm. It was a modest beginning. The first volume had forty-seven pages; the subjects presented were varied, and were practical at the time they were written.

The second volume was double the size of the first, containing ninety-five pages, as did also the third. The fourth and fifth volumes were paged continuously, the two containing 400 pages. The sixth and seventh volumes contained, each, 252 pages, and the eighth, 268. The journal had now an assured place in dental literature. The publishing firm had prospered; they had become the leading dental dealers in the country, and their publication attracted a large circle of subscribers and writers. From the seventh to the twelfth and last volume, it was edited by Dr. J. D. White and Mr. J. R. McCurdy. Dr. White was an accomplished dentist; he was well versed in all that pertained to his profession, an excellent writer, and at this time was at the height of his popularity and usefulness. The remaining volumes had from 300 to 316 pages of well-arranged reading matter. The advertisements were few in number. The subscription price was raised to one dollar, and later to one dollar and a half; a very moderate price, considering that it was nearly all reading matter.

With the last number of the twelfth volume, Mr. McCurdy announced his retirement from dental journalism in a nicely worded valedictory. At the same time he retired from the firm, with which he had been associated, he tells us, nineteen years. He says: "I have at times felt that the claims of the *News Letter* made too great an addition to my labors; yet, after the work was done, I was amply repaid in the gratification derived from the favor with which the profession received and spoke of it." And well he might, it undoubtedly had proved a success.

#### THE DENTAL COSMOS.

On page 279 of the July 1859 number of the *Dental News Letter* is found the following announcement:

This number completes the Twelfth Volume of the *Dental News Letter*, and terminates its existence under that name, and as a quarterly. We propose publishing August 1st the first number of the DENTAL COSMOS, which



will be issued *monthly* under the supervision of three gentlemen well known to the profession, who will be assisted by an able corps of contributors. Dr. J. D. White will have charge of *Original Communications*; Dr. J. H. McQuillen of *Dental Literature*; and Dr. G. J. Ziegler of *Medical and General Science*, in their relation to Dentistry.

Under this arrangement, we hope to secure for the DENTAL COSMOS the highest possible character for literary and scientific ability; afford more frequent opportunities to the profession for an interchange of sentiment on those subjects in which they are most interested; supply more fully the increasing demands of the age; and, by a thorough distribution of Dental intelligence, lead to the general adoption of enlarged views on Dental Science.

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In the selection of a name, while avoiding hackneyed appellations, we have sought to select one expressive of a wide field of observation, and indicative of our purpose to present our readers with a faithful exhibit of the dental world.

With this announcement of our plan and hopes, we cordially invite and confidently expect the co-operation and support of the friends of dental progress.

The term of subscription, \$2.50 if paid in advance; \$3.00 if not paid within the year.

This announcement indicated the inauguration of a new era in dental journalism. It was a forward look to an uplift in dental science; a breaking away from the narrow limits of mere tooth repair and tooth replacement, an uplift that a few years later was realized when the profession adopted a progressive educational standard for its oncoming members, legally enforced. The editorial staff was well chosen. Dr. McQuillen had earned for himself the reputation of a skilled and careful operator; he was a born teacher; he had an exalted idea of the importance of his profession, and had long urged that a dentist should be a man of science, well versed in all the sciences closely related to his own. He was widely known in the profession as an energetic, tireless worker for professional advancement, and had a wide acquaintance with men of science. Dr. Ziegler was a connecting link between the medical and dental professions. He

had practiced dentistry for a short time, but left it for medicine, and was well qualified for the position to which he was assigned. The first volume of the DENTAL COSMOS contained 680 pages.

With the close of the sixth volume Dr. J. D. White retired from the editorial staff. With the close of the thirteenth volume Drs. McQuillen and Ziegler severed their connection, and Dr. James W. White, a brother of the publisher, assumed editorial management. Dr. White was well equipped by education and temperament to supervise a professional journal. He was in full accord with the purpose the first editors of the journal had in view, namely, to treat dentistry as a science rather than as a vocation, and, while not neglecting the handicraft side of the calling, to educate its readers to an appreciation of the science upon which its methods and practices are based, and those other sciences, a knowledge of which is indispensable to a dentist who desires to associate with cultured professional gentlemen. It was this that Dr. McQuillen persistently urged, and for this the DENTAL COSMOS has stood from its first number to the present.

The time came, however, when the welfare of the journal required that its official head should be less concerned in the turmoil of professional activities; it was then that Dr. James W. White took charge. He was approachable, he had no professional hobbies, his insight was quick to distinguish the probable from the improbable, the possible from the impossible, or the true from the false. He was a scholar, and a master of the English language. Under him the DENTAL COSMOS became the leading dental journal of the world, a position it still maintains.

May 27, 1891, Dr. James W. White died suddenly, and was succeeded by Dr. Edward C. Kirk, the present incumbent, who assumed the editorship in July 1891.

In 1917, Dr. L. Pierce Anthony became associate editor. For years he had been keenly interested in dental literature, and had assisted in the preparation

of the journal. His long experience in reporting the proceedings of dental society meetings, and in preparing them for publication has made him familiar with all that is embraced in editing a dental journal.

The DENTAL COSMOS has been particularly fortunate in that its three principal editors, and their associates, have been so well qualified for the task of editing a progressive dental journal, that they have been so fully in accord in leading its readers to a higher appreciation of dental science, and that its publishers have so liberally contributed to make it what they designed it should be as outlined in the first number of the *Dental News Letter*, October 1847, and reaffirmed in announcing its change from a quarterly to a monthly, under a new and more expressive name, July 1859. It has, in the fullest sense of the phrase, "made good."

Since October 1847, what a host of dental journals have come and gone! A majority of them hardly made a ripple in dental literature. Of some, the name survives merely because the journal was noticed by a contemporary, and so became of record. To be the editor of a dental journal seems to have been fascinating to many practitioners. This we infer from the long list of ephemeral dental periodicals; annuals, semi-annuals, quarterly, monthly, and weekly publications that died early. Some, under the guise of a periodical, were mere advertisements of the editor's business; a few, from the descriptions given by their compeers, seem to have been tastefully and artistically adorned in the style of gift books. We know but little of their contents, so few have survived. Some, ostensibly, were for the instruction of the public, and probably took the place of the little books dentists of the "long ago" prepared for distribution to their patients. Others were no doubt intended to be real expositors of dental science or some special phase of dental practice, but failed to receive that welcome from the profession which their authors hoped for, and were discontinued after a few numbers were issued. The

"busy dentist" was well taken care of by editors who claimed to *predigest* the information in their journals, so that it might be assimilated with but little mental effort. Some of these short-lived journals were of real merit, and their early discontinuance a real loss to dental literature. A few dental journals, with an unpromising beginning, have developed into valuable professional publications, having found a "place under the sun" of prosperity.

During recent years the list of dental periodicals has been enlarged by a number published in the interest of specialists—orthodontists, oral surgeons, military dental surgeons, etc.—or a special phase of dental work, such as dental dispensaries or clinics. State dental societies and some local societies have issued periodically bulletins for the purpose of keeping their members informed regarding their societies' work. While these have proved helpful, in a measure, they are of local interest only, and are not usually long-lived.

The cemetery of dead dental journals is enchanted ground for collectors of dental literature, and their finds, although often torn, unclean, stained, and yellowed by years of neglect, have now and again proved valuable additions to the science or to its history. They may contain the early efforts of members of the profession, who later became distinguished as writers and teachers, or valuable practical ideas long forgotten, and we learn from them not to belittle the day of small things.

The dental college journals and those of dental college societies, of which there are quite a number, current and discontinued, while containing little of scientific value, have undoubtedly been the means of providing the profession with many talented writers, and should be encouraged for their educational usefulness. They have furnished an opportunity and an incentive that ambitious students have found helpful toward more serious work later on, and are worthy of a place in dental libraries.

Approximately, about two hundred and fifty American dental periodicals



are on record, and about forty-five are now current. The list compiled by Dr. William Bebb of Chicago, published in the March 1919 number of the *Journal of the National Dental Association*, is by far the most satisfactory on record, and will prove helpful to those engaged in this department of research.

A few of these contemporaries of the *Dental News Letter* and the *DENTAL COSMOS* are worthy in this connection of special notice. They served a good purpose in their day and generation, and are landmarks in the progress of this branch of dental literature.

#### THE DENTAL OFFICE AND LABORATORY.

The publications of Johnson and Lund, of Philadelphia, for a series of years had a wide circulation. The first, the *Dental Quarterly* began March 1862, and ended with the sixth volume. This was followed by a dental newspaper, entitled, the *Dental Office and Laboratory*, the first number, a folio with four pages of reading matter and four of advertisements, appearing in March 1868. At the close of the fifth volume it was discontinued. April 1877, its publication was resumed as a folio of ten pages. January 1887, it appeared as a quarterly in octavo form, and completed twenty-two octavo volumes. It was finally discontinued November 1908. In all, this firm published about forty-three volumes. The first fifteen volumes are exceedingly rare and few complete files are in existence.

#### THE PENNSYLVANIA JOURNAL OF DENTAL SCIENCE.

The *Pennsylvania Journal of Dental Science*, a monthly octavo, published and edited by Dr. Samuel Welchens of Lancaster, Pa., appeared January 1874. Dr. Welchens was impressed that much valuable information was lost in the unpublished proceedings of dental societies, and proposed in this journal to publish the proceedings of the societies in the state. It was an ambitious effort for one man to publish a dental journal, the peer

in size and make-up of any dental journal then published. The sequel proved that the profession of a single state was not equal to the task of maintaining a journal. The first volume, 514 pages, contained fine engraved portraits of Drs. Chapin A. Harris, C. A. Kingsbury, John Allen, and Asa Hill. The second, portraits of Drs. Thomas W. Evans, I. P. Meredith, A. G. Cogswell, and Samuel Welchens. The third contained a paper by Dr. John W. Riggs, read before the American Academy of Dental Surgery, in New York, October 20, 1875, entitled, "Suppurative Inflammation of the Gums, and Absorption of the Gums and Alveolar Process." It is the only communication from Dr. Riggs to the profession over his own signature, describing conditions for some time known as "Riggs' Disease." With this volume the journal ended. Its purpose was commendable, but needed substantial financial backing to achieve success.

Dr. Welchens was undoubtedly right, many valuable ideas brought out verbally at dental society meetings are lost to the profession. The trouble is, and always has been, to get them in proper shape for publication. That done, dental journals will gladly present them to their readers. The proceedings of the Odontographic Society of Philadelphia, published in the *DENTAL COSMOS*, from 1864 until about 1880, are models well worth emulation. The secretary took notes of the discussions and matters of interest brought out in its meetings. Copies of these were sent to the members concerned for elaboration or correction, and returned to the secretary, who "schoolmastered" and prepared them for publication. It is not the words of the speaker, but the ideas presented, clearly expressed, that should go on record. A stenographer's verbatim report, unless revised and well boiled down, is usually an abomination.

#### THE ITEMS OF INTEREST.

*Items of Interest*, a dental journal that has passed its fortieth year, and is still in full vigor, has made, and is



still making an impress for good on the profession. About 1877, Dr. Thomas B. Welch, then of Vineland, N. J., and a prominent member of the New Jersey State Dental Society, brought to their notice a formula for a dental alloy he had found satisfactory. He was asked to manufacture and supply it to the profession. This he did, and soon built up quite a business. To advertise this, he began the publication of a dental journal entitled *Items of Interest*. It was a four-page folio; the subscription price merely nominal. It grew as his business grew. The fourth volume was quarto in size, and issued monthly. It was inconvenient in size, contained comparatively little of real interest beyond its advertisements, and few copies were preserved of these four volumes. They now are sought for by collectors of dental journals as though loaded with gold nuggets. Beginning with the fifth volume it was issued in octavo form, and from this on has become more and more a real dental journal. Dr. Welch was a ready writer. He was bitterly opposed to rum, tobacco, and verbosity, and attacked them often and vigorously in his journal; and also an enthusiastic advocate of reformed, phonetic spelling. He had the happy faculty of expressing ideas clearly, and in a few simple words. He criticized severely the long, drawn-out papers too often found in dental journals, frequently condensing into a few crisp paragraphs several pages. He offered to "schoolmaster" and prepare for publication the work of young dental writers, and no doubt his pungent criticism has been educational to many. His efforts were ridiculed by other journals, but this helped his journal, and helped to make more generally known the reforms he advocated. Financial embarrassment compelled the sale of the journal to the Consolidated Dental Manufacturing Company of New York, July 1896. Dr. R. Ottolengui then became its editor. The combined efforts of its new owners, and its new editor, soon made it a prominent dental journal. In appearance and contents it was a very marked contrast to what it was in

its youthful days. Nevertheless, a perfect file of its first four volumes will sell for enough to pay its present subscription price for nearly half a century. It is doubtful, however, if such a file is in existence.

#### THE DENTAL BRIEF.

The loss of *Items of Interest* did not end Dr. Welch's journalistic career. A dental journal, entitled *Welch's Monthly*, edited by T. B. Welch, M.D., of Vineland, N. J., and published by A. S. Robinson of Philadelphia, appeared August 1896. Dr. Welch modeled his new journal on much the same lines as his old one. With the beginning of the second volume the title was changed to the *Dental Brief*, and its publication assumed by L. D. Caulk, Philadelphia. Dr. Welch was advanced in years, his other business interests were pressing, and he therefore retired on the publication of the March number, 1899. Dr. Wilbur F. Litch then assumed the editorship.

Dr. Litch's editorial ability, aided by the liberality of the publishers, soon made the *Dental Brief* a prominent dental journal. He brought about a transformation quite as great as that Dr. Ottolengui had made in Dr. Welch's first journal, although on somewhat different lines. Dr. Litch was a ripe scholar, his long experience in the profession as a practitioner, writer and teacher, and his early experience as editor of a newspaper, gave tone to his editorial work upon the *Dental Brief*, and the journal prospered. He continued in charge until his death, December 25, 1912. He was succeeded by Dr. Alfred P. Lee of Philadelphia.

In the last number of the eighteenth volume, December 1913, the publishers announced, "The publication of a dental journal of high character and high ethics involves the expenditure of a vast amount of energy, time and money." As their principal business, the manufacture and sale of dental commodities, had so increased that it required all of the time of its managers and employees,

they had decided to discontinue the journal rather than to dispose of it to others who might change its policy.

Dr. Welch, the founder of these two dental journals, died December 29, 1903. Only those who knew him well can fully appreciate his many good qualities, and give him due credit for what he did for dental journalism.

#### THE DENTAL SUMMARY.

The *Dental Summary*, formerly the *Ohio State Journal of Dental Science*, published by Ransom and Randolph, Toledo, Ohio, began its career January 1881, with Dr. George Watt as editor. Dr. Watt was a well-known, skilful dental practitioner, a scientist, a ready and a witty writer, who had had many years' experience editing the *Dental Register*. Under his management the new journal became a decided success. Dr. Watt died February 16, 1893. Dr. L. P. Bethel then assumed the editorship, which he has acceptably held to the present time. On the night of January 4, 1902, the printing office in which the journal was printed was destroyed by fire, and with it the January issue of the journal. In resetting the type, it was thought best by its owners to change its name to the *Dental Summary*. It is still published.

#### THE INTERNATIONAL DENTAL JOURNAL.

The *International Dental Journal* was the successor of a monthly journal published at Baltimore, by B. M. Wilkerson, entitled the *Independent Practitioner*, devoted to medical, surgical, obstetrical, dental, and hygienical sciences, edited by Drs. Harvey L. Byrd and Basil M. Wilkerson. The first number is dated January 1880. "And Popular Sciences" was added to the title page of the second volume. Its scope proved too comprehensive, so that it failed to receive needed support. After several changes of owners and editors it was taken in charge by an association of New York dentists formed for the purpose known as the New York Dental Journal Association. Dr. W. C. Barrett of Buffalo,

N. Y., was appointed editor. The cumbersome title was dropped, and it became a dental journal. Its new owners were impressed with the idea that there was a need for a professional journal entirely free from any commercial interests, and that it was detrimental to professional dignity that all its journals were published by dental dealers. Various like attempts had previously been made by individuals; none, however, had proved successful.

While under Dr. Barrett's management the journal was fairly successful, and it was thought wise to enlarge the enterprise by forming a stock company. Sufficient stock was issued to furnish a working capital, with the understanding that all profits were to be used for the betterment of the journal. The company was known as the International Dental Publication Company, and the title of the journal was changed to the *International Dental Journal*. The stockholders were numerous and widely distributed, the capital paid in deemed sufficient, and the journal seemed to have a promising future. Dr. W. X. Sudduth became the editor and business manager. Dr. Sudduth having accepted a position in the University of Minnesota, resigned as editor in July 1890. Dr. James Truman of Philadelphia was then elected editor. For some years the journal was quite successful. Its pages were filled with well-written original matter, and it was accorded a prominent place among the dental journals of the day. Later, all the dental journals reduced their subscription rate from two dollars and a half to one dollar. The *International Dental Journal* was unable to meet this reduction. It was discontinued at the close of the twenty-sixth volume, December 1905. Immediately thereafter the International Dental Publication Company wound up its affairs. All obligations were promptly met and it disbanded. This was by far the most successful effort ever made in the United States to publish an independent dental journal.

In conclusion: Looking carefully over the history of dental journalism in the



United States, the thought will come, Is the often-expressed objection to dental journals published by dealers in dental supplies well taken? The history of the *Dental News Letter* and its successor, the DENTAL COSMOS, starting as they did with a well-defined ethical policy, strictly carried out, which has produced seventy-two annual volumes showing no trace of interfering commercialism; and further, that this has been duplicated for a lesser period by many other dental journals, warrants the reply—It is not. The few brief sketches of dental journals given in this article show conclusively that the business end of a dental journal is the most difficult to manage successfully, and that its proper management is essential to a journal's continued existence.

Sentiment is all very well, but it pays no bills. Enthusiasm is merely a little

more draft for the fire, it makes it burn more briskly—at the expense of the fuel.

Among the host of dental journals, now deceased, were many that started with high ideals, lots of enthusiasm, and well equipped with everything but the essential finances and ability to properly use it. The result: In a little while—the editor “was tired.”

“Nothing succeeds like success.” Back of it, however, is a something, call it energy, ability, opportunity, or what you will, that makes success. It is the common denominator of every calling or vocation, professional or commercial. What has made the *Dental News Letter* and the DENTAL COSMOS so phenomenal a success for nearly three-quarters of a century? Find that, and the key to successful dental journalism is in your grasp.

902 SPRUCE ST.

## A Practicable Root-canal Technique.

### III: Asepsis.

By ARTHUR B. CRANE, D.D.S., Washington, D. C.

(Continued from vol. lxi, page 1204.)

THE object of asepsis is to reduce to a minimum the amount of infection which may be introduced into the field by an operation. Any aseptic technique gives at best only relatively sterile results. The most careful surgeon cannot incise the skin without some contamination. Fortunately, most of the organisms thus introduced are non-pathogenic, and the natural resistance of the tissues defends them from the baneful effects of bacteria, if introduced only in limited amount. Natural resistance is dependent upon the elements of the blood stream, which is entirely absent from the dentin of a pulpless tooth.

Thus the difficulty of an aseptic root-canal technique is augmented at the start. Add to this the natural disinclination of the patient to submit to the inconvenience of sterile wrappings for the head and face, as well as his average inability to pay for the time thus consumed in many sittings, and the difficulty increases. Furthermore, consider that the use of rubber gloves robs the dentist of that delicate sense of touch so necessary to the proper performance of root-canal work, and that even with the greatest care the hands will usually have to come into contact with some unsterile object, and the achievement of an aseptic



operation as it is generally understood by surgeons becomes next to impossible. Notwithstanding these difficulties, the dentist is no more justified in introducing infection by way of the root-canal, than the general surgeon is in doing so by way of the integument.

The operative field in root-canal work is the smallest known to surgery and this to some extent offsets the danger of our somewhat loose technique. Bacteria can infect only the object with which they come into actual contact. Therefore the necessities of the case only demand that nothing shall enter the pulp chamber which may carry contamination. It is the belief of the writer that this result may be assured by the simple technique which follows.

Before the canal is opened it is a wise precaution to attempt the sterilization of the coronal dentin. I am indebted to Grieves for suggesting a 10 per cent. solution of beechwood creasote in oil of cloves for this purpose. The clove oil is used as a penetrating menstruum to carry the creasote, which in 10 per cent. solution is not coagulant in the dentin. Where the pulp chamber has not been opened or where the canals are blocked off by previous fillings, formo-cresol is a valuable agent. Either of these drugs must be sealed in for three or four days, as it requires that time to sterilize dentin by such means. Where discoloration of the tooth is not an objection, Howe's silver reduction method may be used and the delay avoided.

#### STERILIZATION OF ROOT-CANALS.

After the attempt to sterilize the coronal dentin, the tooth should be opened only when blocked off by the rubber dam, which should expose as few teeth as are necessary to give an unobstructed view. The dam should be adjusted in such a manner that there is no possibility of leakage of fluids from the mouth. The teeth included should be rubbed dry with gauze or cotton to remove the mucus, and the entire field then painted with tincture of iodine. After this has dried it is washed off with

alcohol to lighten the field. The coronal cavity may now be opened.

Where cavities extend below the gingiva, or the crown is wanting, it is necessary to prepare the tooth for the reception of the rubber dam. This is most conveniently done with the manufactured copper bands which are supplied for amalgam work. The band should be cut to conformity with the gingival margin and articulation and be securely cemented to place with a good crown-and-bridge cement. For anterior teeth the band may be cut away labially in such a manner that a flat back facing may be ground to fit. By arranging the facing so that it does not come into contact with the opposing teeth in mastication, and bending the pins together to form an arch, it will adhere to the gutta-percha reasonably well for two or three days.

Cotton and dressings used in root-canal work are probably the most frequent sources of contamination. To avoid this the operator should have available a sufficient number of sterilized packages to meet his daily need. The package is prepared as follows: a thick towel, large enough to cover the operating table is folded evenly to a size about four by eight inches. Upon one end of this is laid a small J. & J. napkin folded twice upon itself. On the napkin are laid two sections of cotton rolls, about two dozen J. & J. absorbent points, a number of small cotton balls and at least half a dozen smooth broaches wrapped with cotton. Three or four of the long Darby absorbent points will also be found useful. These dressings are now covered with another folded napkin and the towel folded over it. The whole is now securely but not tightly wrapped in a piece of unbleached muslin, which is pinned to hold it together. As many of these packages as may be required are daily made up and sterilized.

#### STERILIZATION OF DRESSINGS AND INSTRUMENTS.

For the sterilization of dressings there is nothing so absolute as the autoclave or high pressure sterilizer (Fig. 1). When

subjected to steam under fifteen pounds' pressure for twenty minutes positive sterilization is assured. Then by subjecting to negative pressure for about ten minutes, the packages are rendered almost free from moisture. This is of great advantage in preventing rust on

FIG. 1.



Sterilizing room made in closet. Autoclave for goods in packages and wet sterilizer for instruments.

the cotton wrapped broaches. High-pressure sterilizers are somewhat expensive, but the certainty of sterility makes the expenditure worth while for any dentist who does much root-canal work.

Next in efficiency to the autoclave for this purpose is an ordinary gas cooking range. Almost any large vessel may be so arranged to support a perforated platform on which the dressings may be subjected to live steam, without actually

coming into contact with the boiling water. After thirty minutes of such treatment, the packages may be placed on a tray and put in the oven to be subjected to dry heat for an hour or two. Care must be taken to prevent overheating the oven and thus burning the dressings.

The Pentz sterilizer is advocated by many careful root-canal workers, and probably is efficient for cotton or gauze laid loosely on the tray, but if such a

FIG. 2.

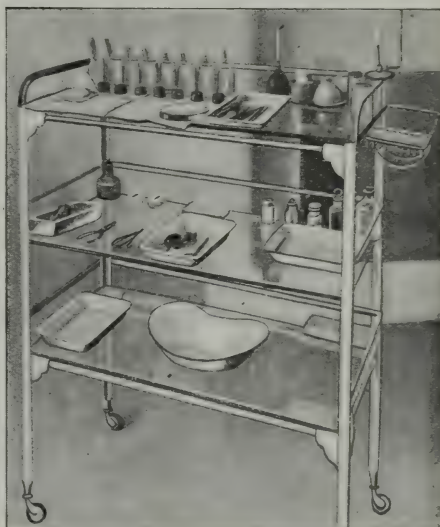


Table set for aseptic root-canal technique.

method of sterilization were satisfactory for goods in packages, one would expect to find it in use in our large hospitals.

A mouth mirror, two or three pairs of cotton pliers, rubber-dam clamp forceps and clamps, a pair of collar pliers, a few broach holders and necessary excavators, chisels and burs should be placed upon a perforated tray and sterilized by boiling for twenty minutes prior to the operation.

Barbed broaches and smooth broaches for carrying cotton dressings may be kept in alcohol. Wide-necked bottles, such as the ordinary amalgam bottle, are fitted with corks, into the under side of which the broaches are stuck in such a manner



that when the cork is in the bottle the instruments will be immersed in the alcohol. The addition of one part of oil of sweet almonds to nine parts of alcohol, will prevent rusting, no matter how long the instruments are thus kept.

Having made the foregoing preparations, we are now ready to set the table for the operation (Fig. 2). The ordinary bracket table is so unsteady that greater safety is assured by using a glass surgical table, so placed that it is within easy reach of the operator and assistant. To the back of the table may be placed the medicaments likely to be of use, such as iodine, alcohol, canal antiseptics, peroxid of hydrogen, 30 per cent. sulfuric acid, xylol, temporary stopping, etc. At one end a Bunsen burner should be arranged, as it is frequently necessary to flame the cotton pliers or collar pliers. An open receptacle, such as a hair-receiver, for waste material should also be provided.

The table top is wiped off with alcohol and covered with a sterile towel from one of the packages. The package should be opened in such a manner that the fingers do not contaminate its contents. The towel is then removed with two pairs of flamed forceps and spread upon the table. The package of dressings is placed on the end of the towel, being sure that they are completely covered by one of the folded napkins. On the extreme back of the towel are now set the bottles containing the broaches in alcohol. The corks are removed and reversed and set upon the towel just in front of their respective bottles. The long-handled broaches are then placed in the bottles to sterilize.

#### INSTRUMENTARIUM.

A very good assortment of root-canal instruments is as follows:

1st bottle—Four pathfinders of assorted sizes.

2d bottle—Four apexographers of assorted sizes.

3d bottle—Two XXX and two XX Rhein root-picks.

4th bottle—Two X and two fine Rhein root-picks.

The handles of these instruments should be so marked with a file that the size can be determined at a glance.

5th bottle—Two No. 1 and two No. 2 Kerr root-canal files.

6th bottle—Two No. 3 and two No. 4 Kerr root-canal files.

7th bottle—Two No. 5 and two No. 6 Kerr root-canal files.

These instruments have the irritating tendency to loosen in the handles, but the makers claim that those now being manufactured are improved in this respect.

8th bottle—Two large and two small Young broaches.

9th bottle—Assorted sizes Rhein canal enlargers.

The handles of all these instruments should lean to the side of the bottle next the operator. When one is used it is returned to the bottle leaning in the opposite direction, thus resting the instrument.

Short-handled instruments should be placed in a covered Petri dish well filled with alcohol. A half dozen of the three smaller sizes of Kerr root-files, a couple of small Young broaches and a few fine barbed broaches make a satisfactory assortment. When a short-handled instrument is used the finger should be thoroughly immersed as the instrument is picked out of the alcohol. As soon as they become dry they should be immersed again, otherwise contamination of the fluid may be expected.

The assistant may set the table while the operator is washing his hands, adjusting the rubber dam and removing the temporary filling. By this time the instruments in the alcohol will be sterile and the operation may proceed.

The cotton rolls in the sterile packages are for use in the event of the inadvertent puncture or tearing of the rubber dam while the coronal cavity is open. By stretching the dam a trifle, one of these rolls held in forceps may be made to plug the opening while the coronal cavity is sealed, after which a new piece of dam should be adjusted before continuing the operation. The rolls are also

useful for making sterile cotton swabs for the canal in the following manner: From a cork containing fine barbed broaches which have been somewhat worn down by use, select one of proper size, sticking the barbed end into the cut end of the roll and giving it a couple of turns. Upon withdrawal the cotton fibers will be wrapped around the instrument in such a manner that they will not slip from it in swabbing out the canal. Still another use for the rolls is absorbing solutions used to irrigate the canal.

For use in quickly sealing the cavity in the event that it is necessary to change the rubber dam a number of small cotton pellets are dropped into melted paraffin and allowed to boil for twenty minutes. They are then individually removed with

sterile cotton pliers and laid on a sterile towel to cool. When they have hardened they are placed in a screw-top bottle and kept in a convenient place on the table. When needed it is only necessary to take one in the cotton pliers and hold it an instant over the Bunsen flame, when it may be pressed into the cavity effectively sealing it while the dam is being changed.

Gutta-percha points should be prepared for use as follows: Dip in iodine and place on sterile glass slab to dry, wash off with alcohol, and then place in an alcohol bath in a suitable covered container.

921 N. 15TH ST., N. W.

(To be continued.)

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## Apicoectomy—the Culmination of Perfect Root-canal Operations.

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### PRIMARY CONSIDERATIONS.

ON reviewing the voluminous literature on this subject during the last decade, one cannot but appreciate the wonderful achievements made in the attempt to save and preserve teeth, in order to give comfort and add longevity to suffering humanity.

The advent of conduction anesthesia has been the greatest boon to both suffering humanity and to the dental practitioner; by its application the cause of the suffering may often be removed, and for the dental and oral surgeon is made possible the performance of such operations which heretofore were looked upon with great awe and scepticism. In this field full credit must be accorded such

men as Bunte, Moral, Konrad Cohn, Eckström, Hübner, Luniatschek, Ritter, Rosenberg, Sachse, Möller, Paul, Peckert, Port, Prinz, Schamberg, Sauvez, and many others, for their valuable contributions toward the perfection of the technique and its adaptation to our work.

Nevertheless, in spite of the advancement and remarkable achievement in dental science, the profession has been made the target of criticism by members of its own as well as by members of the allied medical profession. Their criticisms have been based upon the assumption that infected root-canals and morbid conditions about the apical ends of teeth are detrimental to the health of the patient, and are frequently the primary cause of systemic disturbance. It has



also been stated that the present accepted method of treating and filling root-canals has proven unsuccessful, and that the only solution to the problem is extraction. This has been very clearly demonstrated by Professor Rosenow of the Mayo Foundation in his recent lecture before the members of the First District Dental Society of the State of New York. He stated very frankly and openly that it was a grave injustice to the patient to treat infected root-canals of those suffering with any systemic infection; that the only time it was permissible to treat devitalized teeth was in the absence of any constitutional disturbance, and with the patient's resistance rather high. Furthermore, that these root-canal operations should be performed under strict surgical asepsis, and that the root-canals should not be filled until the proper tests had been made to determine whether or not the canals were *absolutely sterile*. This naturally would demand of the dental surgeon a more thorough knowledge of bacteriology.

Faulty dental work is very often traceable to the routine slovenly habits of the dentist who has had no more than a superficial smattering of science and art. The time has arrived when the dentist is required to have more than a mere knowledge of the mechanics involved in the practice of dentistry. It has been clearly demonstrated that the success of any oral restoration depends to a great measure on the knowledge one possesses of oral surgery and bacteriology. Dr. C. Everett Field, director of the Radium Institute of New York City, in his report to the *Journal of the American Medical Association*, stated that there have come under his observation many instances in which faulty artificial dentures have caused the development of malignant growths. These conditions are only due to the meager knowledge possessed by the dental practitioner of the pathological conditions produced by constant irritation and undue pressure on the mucous membrane of the mouth. These pathological conditions are the results of lack of knowledge on the part of the dentist in such branches of the medical science

as oral surgery and bacteriology. These two departments, however, have not been neglected voluntarily by the dental practitioner.

Whether or not a devitalized tooth is to be retained in the mouth of a patient depends mainly on (1) the constitutional condition of the patient, and (2) pathological conditions attending such a tooth. As has been previously stated, in the light of our present bacteriological knowledge, the saving of devitalized teeth is contra-indicated in patients suffering from any systemic disturbance. An attempt may be made at saving the tooth providing it is followed by root resection only in such patients as are free from any systemic disturbance, whose resistance is normal, and if none of the following oral pathological conditions are found: (1) Acute alveolar abscess, with or without a fistula; (2) granuloma; (3) exostosis; and (4) foreign bodies in root-canals. The above conditions are absolutely essential since we have come to realize the importance of sterilization of root-canals and of the areas above the apices of such teeth. While it may be possible to sterilize the root-canal, nevertheless, no matter how perfectly the technique may be carried out under strict asepsis, an element of doubt always enters whenever it comes to the region above the apex, and it is from this source that systemic infection follows. Therefore to remove that element of doubt and make the operation successful, apicoectomy or root resection should be the culmination of all perfect root-canal operations.

The next important consideration in this work, assuming that we have a favorable patient for this operation, is the proper root-canal technique, performed with the greatest amount of skill and care and under ideal conditions. Then, also, it becomes imperative that proper roentgenograms of the involved region be obtained to determine the proper diagnosis. It should be understood, however, that the roentgenograms are primarily an aid to the diagnosis. The basic principles of the latter involve a physical examination in all its aspects. This

operation is applicable to all the teeth excepting the third molars. Single-rooted teeth offer the least amount of difficulty; in multi-rooted teeth the operation is very often materially simplified by excising the entire root involved.

#### PATHOLOGY OF DISEASED ROOT-ENDS.

It may not be amiss to rehearse the pathology of diseased root-ends, as has been so ably described by Thoma.

Alveolar abscesses, caused by diseases of the dental pulp, involve two distinct chains of pathological processes. The first is spoken of as an acute alveolar abscess, and represents a process of destruction in which the tissue is dissolved into pus, while the second is rather of a constructive nature, producing inflammatory new-growths in the cancellous portion of the bone.

The acute alveolar abscess is caused by a large invasion of pyogenic bacteria, and is accompanied by a violent reaction in the tissue. This is followed by a rapid increase in the size of the membrane, tending to push the tooth from its socket. If this condition continues, tissue destruction sets in, and small necrotic areas result.

The chronic alveolar abscess or granuloma stands in contrast to the process of acute inflammation, and pathologically is placed between pure inflammation and neoplasm. It is not a tumor, but distinctly a chronic inflammation, often known as "chronic proliferative pericementitis." The lesion represents a reaction to a mild inciting agent, such as bacteria in small numbers and of low virulence, or chemical irritants, such as formaldehyd, as well as the toxins produced by bacterial action. The reaction which is caused by the injurious agent consists of a proliferation of the fibroblasts and vascular endothelium of the peridental membrane. The part nearest the point of injury becomes infiltrated with lymphocytes, a small number of leucocytes, with the formation of plasma cells, all of which become surrounded by a fibrous membrane which is continu-

ous with the peridental membrane. These granulomata increase at the expense of the surrounding bone. At this stage the granuloma, surrounded by the fibrous capsule, extends into the medullary spaces between the trabeculae of the bone. This is the reason that the granuloma is held back in the jaw after the tooth has been extracted.

The most frequent type of granuloma found in the oral cavity is that of epithelial origin. In the normal peridental membrane are often found the remains of the embryonic enamel organ. The presence of epithelial cells is not constant in the peridental membrane, but should they enter into its formation the irritating influence of the chronic inflammatory condition causes a proliferation, and we find dividing and branching chains of epithelial cells which grow like a network through the lesion. At this stage the cyst is formed.

In epitheliated granulomata attended with necrosis, it is found that the epithelial strands have a tendency to grow between live and necrosed tissue, usually giving an appearance of an endeavor to encapsulate the tissue destroyed. These epithelial linings may actually be found to cover the entire inner surface of the lumen of the granuloma, which is the beginning of a cyst. The exudates accumulating in the lumen cause the extension of the cyst, and its growth is unlimited.

#### DIAGNOSIS.

The diagnosis of an acute alveolar abscess is easily made from the clinical picture of acute suppuration. The invading pyogenic bacteria (of the streptococcus group) of high virulence cause a rapid and violent periapical tissue reaction, followed by pain, tenderness, and swelling. The roentgenogram may show the destruction of tissue and bone. Sometimes it is quite distinct, having an irregular outline, whereas on the other hand it may appear like a faint veil, possibly due to the infiltration with pus of the cancellous structure. If the infection is hidden behind or in front of the root it may not be evident on the



film. The organism may be so virulent as to cause destruction within twenty-four hours after suppuration commences.

The diagnosis of a chronic alveolar abscess or granuloma is oftentimes difficult, particularly in the absence of any definite history and of objective as well as subjective symptoms. Such aids as history of previous subacute attacks, evidence of old fistulous scars, tenderness to digital pressure of the glands or lymph nodes of the neck, tenderness of the tooth to sharp percussion, and the presence of general systemic involvement, are valuable in arriving at the proper diagnosis.

A granuloma or chronic proliferative pericementitis may exist for many years, constantly causing a slow disintegration of the bone, and the cavity thus produced acts as a reservoir for a purulent exudate, without any external manifestation.

Cystic conditions may be diagnosed by the somewhat regular and definite outline and fairly dark shadow in the roentgenogram. As has been noted before, they are attended by necrosis, and can be seen near the surface of the bone at times as a very dark shadow varying in size from a pea to that of a plum.

#### INSTRUMENTARIUM.

The selection of the proper instruments necessary to carry out the operation of apicoectomy speedily and most successfully seems to be a matter of personal equation. The writer's clinical experience warrants the recommendation of the following instruments for this work: (1) Fischer syringe with proper needles for anesthesia. (2) Numerous wooden applicators with sterile cotton twisted on one end. (3) Cheek retractors. (4) Sharp scalpel. (5) Periosteal separator. (6) Gum retractor. (7) Curved scissors. (8) Bone chisels or gouges of various sizes and shapes. (9) Nickel-weighted mallet. (10) Curets of various sizes. (11) Hemostats straight and curved. (12) Full curved suture needles. (13) Needle holder. (14) Black silk No. 3. (15) Normal saline solution. (16) Novocain-suprarenin tablets E. (17) Tincture of iodine 7 per cent. (18) Sterile plain gauze. (19)

Iodoform gauze. (20) Several pairs of thumb forceps.

In order to insure success in this operation, all canals should be properly sterilized and filled by a technique embodying all the principles of Rhein, Callahan, and others. It is preferable to have this work done several days before attempting apicoectomy. The completion of all restorative work for the tooth in question should also be accomplished before this operation. Malocclusion should be corrected, and the mouth placed in proper hygienic condition.

#### ANESTHESIA.

Perfect anesthesia is absolutely essential to successful root-amputation. Either infiltration or conduction anesthesia may be employed. The clinical experience of the writer is that a combination of infiltration and conduction anesthesia undoubtedly gives the best results. It is imperative that the operation be performed with as little pain as possible, therefore any reasonable method of combination which accomplishes the desired result is suitable. If the correct technique is carried out the patient experiences practically no pain.

In operating on the upper six anterior teeth it is essential to make an infra-orbital injection on both sides on account of the intermingling of the anterior peripheral branches of the superior maxillary division of the fifth cranial nerve. This procedure insures perfect anesthetization of the entire area. Two cc. of a 2 per cent. solution of novocain-suprarenin is all that is ordinarily required for a single injection. The application in the nostril of a 20 per cent. novocain-suprarenin solution in distilled water, applied with a good-sized nasal tampon (as suggested by Dr. Prinz) to paralyze the nerve filaments not reached by the injection is also advisable.

The time necessary to elapse between the injection and the first incision varies from ten to twenty minutes for tuberosity and infra-orbital injections, and one-half hour for mandibular injections. The beginning of an operation too soon causes the patient to suffer much un-

necessary discomfiture and pain. It is unnecessary to hasten the first incision, since the anesthesia will last from forty-five minutes to one hour.

#### TECHNIQUE OF THE OPERATION.

The patient is prepared for the operation by having the head and eyes covered with sterile towels and the operating apron adjusted. A seven per cent. solution of tincture of iodine is applied to the mucous membrane around the field of operation. The lips are retracted, the saliva ejector is placed in the patient's mouth, and sterile pads are placed around the teeth. After observing the direction of the root in the roentgenogram, and its relation to the adjacent roots, the semilunar incision introduced by Partsch is made near the apex of the tooth in question, cutting deep through the periosteum to the bone. In both jaws the apex of the incision points toward the teeth. This permits the retraction of the formed flap without undue stretching of the adjacent parts. The periosteal separator is now used to disengage the entire flap from the bone. Old cicatricial tissue often causes difficulties in loosening this flap from the bony adhesions. This flap is held back by the assistant, using a gum retractor for that purpose. The bone over the affected root is carefully removed, using a mallet, sharp chisels and gouges, cutting out a good-sized oval-shaped window. The opening now reveals the infected root-end, which is severed with a small, sharp carpenter's chisel. This opening is enlarged with a curved chisel, and every vestige of necrosed bone and granuloma is scraped with curets from the periapical space until a clean bony cavity is obtained. This bony cavity is then swabbed with warm normal saline solution, dried with sterile gauze, and inspected to determine whether any portion of the operation has not been properly performed. The area must be as clean as marble, and the filling in the canal of the resected root must be seen clearly. The sharp edges of the root stump are rounded off with chisels, and the cavity again swabbed with normal saline solution.

The successful termination of this operation is dependent upon the pain-taking curettage of the fungoid growth from the bony cavity. The retractor is removed, the cavity is then painted with a 7 per cent. solution of tincture of iodine, and in a great majority of cases the wound closed by suturing the flap with three sutures, using the No. 3 black silk. In suturing care should be taken to engage enough tissue to prevent tearing out of the sutures, and not to draw them too tightly.

#### POST-OPERATIVE TREATMENT.

This consists of advising the patient to apply cold compresses to the face over the area operated upon for five minutes every hour for the first day after the operation. If the post-operative pain is severe, the patient is advised to take 5 grains of aspirin every two hours, or ten grains every four hours until relieved. The patient should report every day for five days, and the operated area be touched with a little tincture of iodine. On the fifth day the sutures may be removed, using for this purpose a pair of thumb forceps and sharp scissors.

As has been stated before, all teeth are amenable to this operation excepting the third molars. Nevertheless a word of caution is necessary, as it will be found occasionally that the upper canines, bicuspid, and first molars lie in close proximity to the maxillary sinus, and therefore care should be taken not to accidentally open into it. In the lower jaw the surgeon should pay attention to the mental foramen in the region of the apices of the lower bicuspid. The lower molars offer many difficulties on account of the heavy buccal plate, and the close proximity of the apices to the inferior dental canal. In such teeth it is preferable to remove the root *in toto*.

As to how long it will take nature to regenerate new bone, is a question that cannot be answered at this time, since many factors concerning the regeneration of tissue are dependent upon the latent powers of the individual concerned.



## Histo-pathology of the Jaws and Apical Dental Tissues.

No. VI:

### Development of the Cementum.

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By EUGENE S. TALBOT, M.D., D.D.S., Chicago, Ill.

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THE large amount of material at hand in all stages of development gives me a splendid opportunity to study the actual dates and manner of development of the cementum. The microscopic slides, which have been duplicated over and over again, demonstrate the actual changes which take place in apical dental development. The technique in the preparation of these sections for the microscope was so wonderfully performed that the student can readily see with the naked eye the progress in the growth of the different structures of the apical dental tissue.

Before discussing the development of the cementum, in order to understand what is to follow we must at this point review in as few words as possible what has already been demonstrated.

The author has shown in a general way how the crown of a tooth is formed. The dental follicle develops inside of the moat, and is only attached to fibrous tissue at the base (the drawbridge), so that the sac is held in position like an anchored balloon. This fibrous tissue contains quantities of arteries, a few of which pass from the main dental artery directly into the pulp tissue; many other arteries run transversely in all directions in the fibrous sac. Later, fibrous tissue develops around the follicle, but at some distance from it for the purpose of holding the lime salts; this later becomes the alveolar process.

Inside the sac or follicle the dentin commences to form, first at the cusps, and is well under way as far as the neck

of the tooth. The enamel is completely formed; the inner layer of the epithelium and the stellate reticulum have disappeared. The external epithelium is still in its original position on the inner surface of the fibrous sac, from the base of what is generally understood as the neck of the tooth, externally over the entire enamel of the crown. It may be situated close to and in contact with the crown; or it may be located quite a distance from it.

The crown of the tooth now begins to rise in the follicular sac by the development of the root. The dental papilla begins to elongate, and the odontoblastic layer deposits dentin along the border of the root. This process continues until the root is completely outlined. A shell-like surface of dentin now covers the entire external surface of the root. The entire tooth, crown, and root are fully outlined inside the sac.

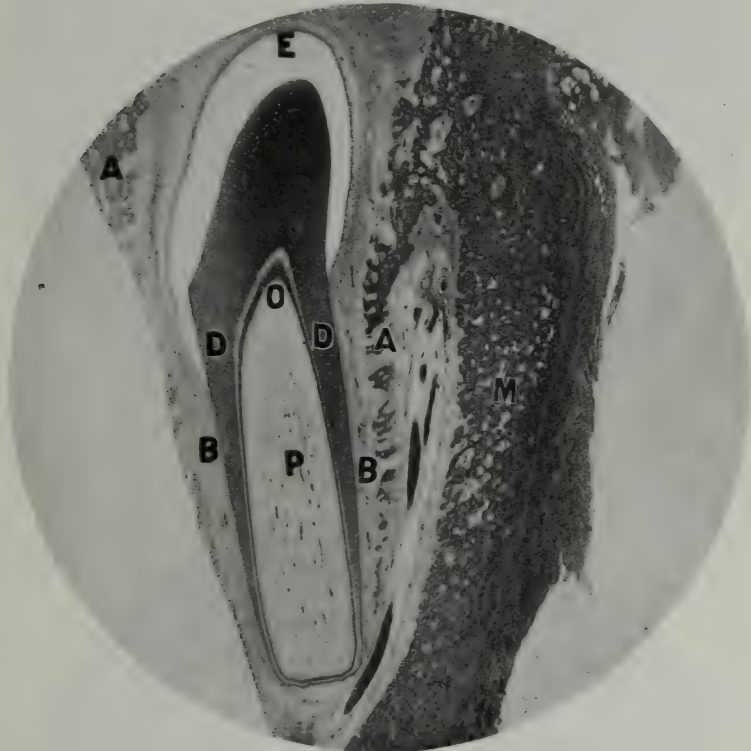
If the external epithelial layer and the fibrous sac are in close contact with the enamel when the root begins to form, necessarily these tissues are stretched and thinned out by the upward and downward movements of the crown, and the lengthening of the root. The thinnest part of these tissues would naturally be located at the extreme edge of the enamel, tapering down toward the neck. Not infrequently the external epithelium and the sac walls are punctured at the extreme point, if the tissues are tense at that locality. On the other hand, there is frequently so much material in

the external epithelium and the sac wall that there is no strain upon these tissues, and the normal thickness of both the external layer and the sac wall remains when the root is completely formed.

The contour of the crown and the root are now completely established within the sac by the complete calcification of

mentum. As soon as the dentin has formed upon the outer surface of the dental papilla within the sac, and the alveolar process with its bloodvessels upon the outer side of the fibrous sac, the inner surface becomes specialized, and that part which covers the dentin is called the peridental membrane, while

FIG. 1.



(Magn. 6.)

the enamel and the external surface of the dentin.

While the formation of tooth structure has been going on inside the sac, fibrous tissue has been developing from the alveolar process extending across the moat, uniting with the fibers of the sac upon the outer surface. This fibrous tissue is rapidly filled with calcium salts, as observed by the illustrations. In the formation of the fibrous tissues, arteries, veins, and nerves also develop to nourish the sac for the formation of the ce-

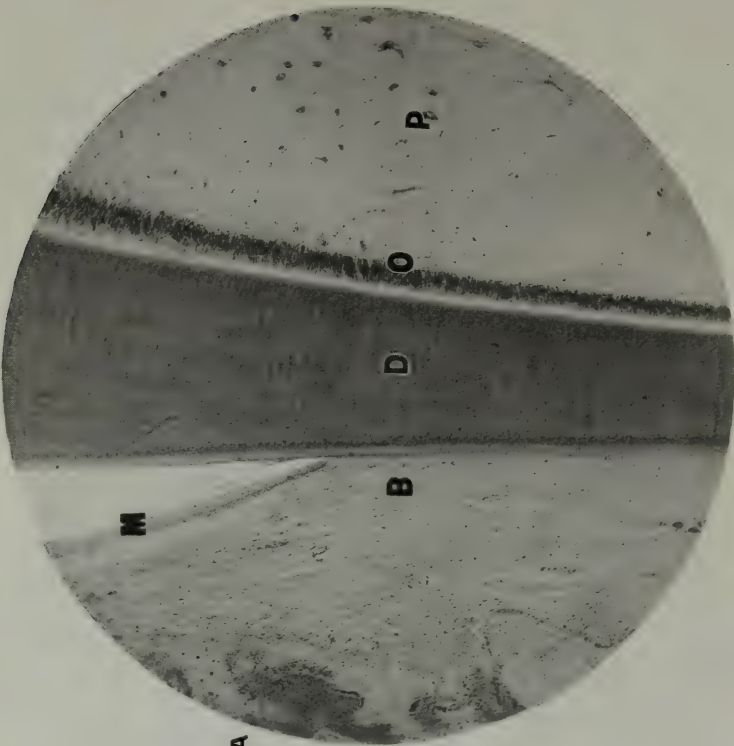
mentum. The part which covers the enamel and external epithelium remains unnamed.

In paper No. V, "Development of the Peridental Membrane," I demonstrated and described the evolution of the peridental membrane up to its transformation. In this paper the further evolution of the peridental membrane and the formation of the cementum will be considered.

Fig. 1 is a lower incisor of a lamb: A is the alveolar process, B the sac wall just about to specialize into the peri-



FIG. 3.



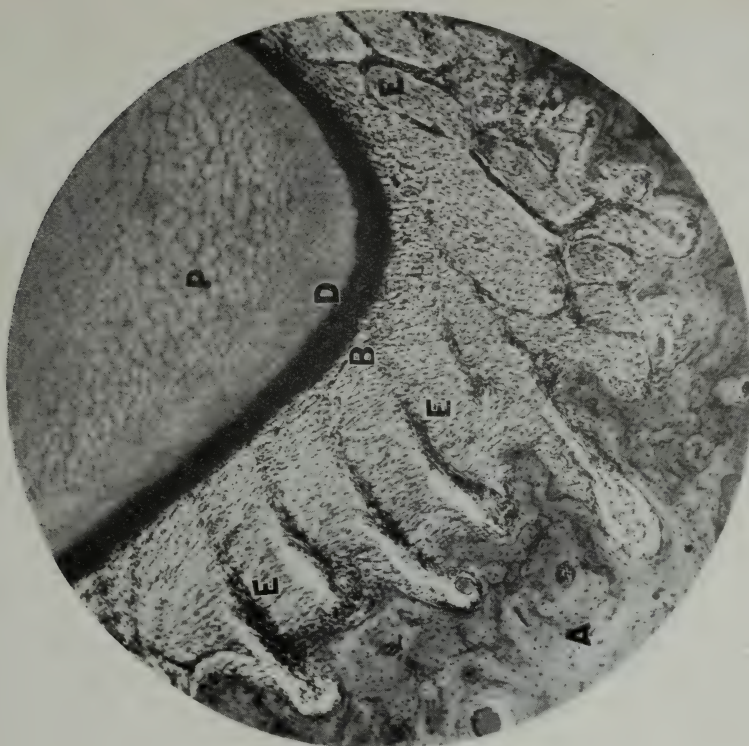
(Magn. 36.)

FIG. 2.



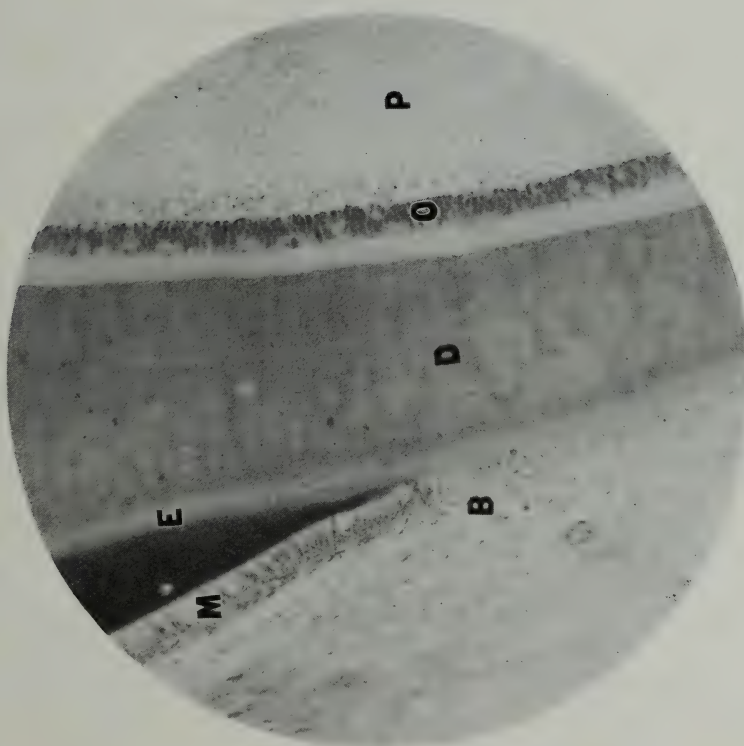
(Magn. 36.)

FIG. 5.



(Magn. 60.)

FIG. 4.



(Magn. 110.)



FIG. 6.



(Magn. 60.)

FIG. 7.



(Magn. 22.)

dental membrane, *D* the dentin which now outlines the entire tooth, *E* the external epithelial layer, *M* the mucous membrane of the lip and the external skin, and *O* the odontoblastic layer. The moat around the follicle has filled in with fibrous tissue, and the lime salts are beginning to form bone. This picture therefore settles the long-mooted question, "When does the cement begin to form on the root of the tooth?" Answer: When the dentin has outlined the root of the tooth as shown in this picture, and after the moat has been bridged with fibrous tissue for the purpose of supporting arteries, veins, and nerves extending from the surrounding tissue direct to the sac wall to furnish material for the cement substance. This tooth is without enamel. The external epithelial layer of the enamel organ, however, is well shown in the picture.

Fig. 2 is a higher magnification of the end of the root of Fig. 1: *B* is the sac wall just beginning to specialize for the purpose of forming cement. (The change in structure is noticed at the left-hand corner of the picture.) *D* is the dentin which has outlined the root of the tooth, *O* the odontoblastic layer, and *P* the pulp.

Fig. 3 is taken at the left of No. 1 at the neck or gingival space: *A* is the alveolar process, *B* the peridental membrane just beginning to specialize, *D* the dentin, *M* the external epithelium, *O* the odontoblastic layer, and *P* the pulp.

Fig. 4 is the tooth of a dog, the picture having been taken at the same locality as that of Fig. 3. This picture is of a higher magnification. The alveolar process therefore does not show. The space (moat) has been bridged across so that the arteries can nourish the peridental membrane: *B* is the peridental membrane showing the specialization of the tissue. (It is further advanced than in Fig. 3.) *D* is the dentin, *E* the fully formed enamel, *M* the external epithelial layer, *O* the odontoblastic layer, and *P* the pulp.

Fig. 5 is the end of the root of a tooth of a lamb at birth: *A* is the alveolar process just beginning to follow up and

fill in the advanced fibrous tissue, *B* the fibrous sac. The fibers from the alveolar process have developed across the moat, and have united with the fibers of the sac. *D* the dentin, *E* the arteries from the alveolar process following the fibrous tissue for the purpose of nourishing the developing peridental membrane to form the cementum. The arteries reach the fibrous sac and stop. At the left some of the arteries turn and return. Hence the structure is an end-organ. The fibrous sac is just beginning to specialize to form the cement.

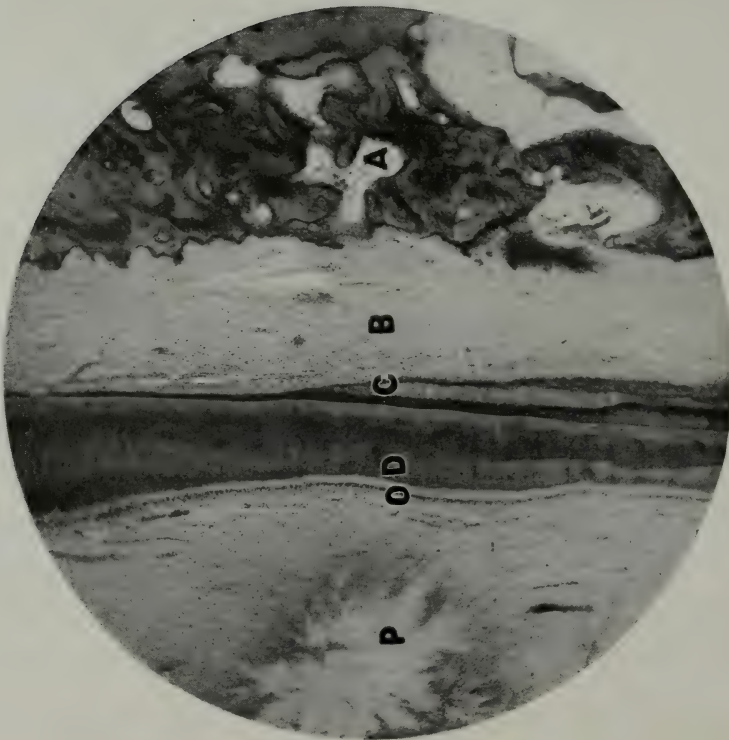
Fig. 6 is the bifurcation of the roots of a deciduous molar of a dog: *A* is the alveolar process, *B* the peridental membrane, *C* the cementum, *D* the dentin, and *E* arteries extending from the alveolar process into the peridental membrane. Note the large quantities which radiate at this locality. This is very important to bear in mind, for the reason that when the subject of peridental, blind, or cold abscesses are considered we can readily understand why they form so frequently at this locality.

Fig. 7. I am purposely returning to this picture, which is similar to those shown in paper No. V, "Development of the Peridental Membrane," the deciduous molar of a dog: *A* is the alveolar process, *B* the sac wall with the nidus of arteries at the base, *D* the dentin, *E* the enamel, *F* the external epithelial layer, *O* the odontoblastic layer, *P* the dental pulp, and *M* the moat or space around the dental follicle. The base has become detached in the preparation for the microscope. The marked points to be remembered are that the dentin has not fully outlined the root of the tooth, the moat is not filled with fibrous tissue for the purpose of carrying the arteries from the alveolar process across to the fibrous sac, and hence the fibrous sac has not yet begun to specialize to form cementum.

Fig. 8 is the root of a tooth of a lamb: *A* is the alveolar process, *B* the peridental membrane, *C* the cementum just beginning to develop, *D* the dentin, *O* the odontoblastic layer, and *P* the pulp. In this tooth all of the requirements have been

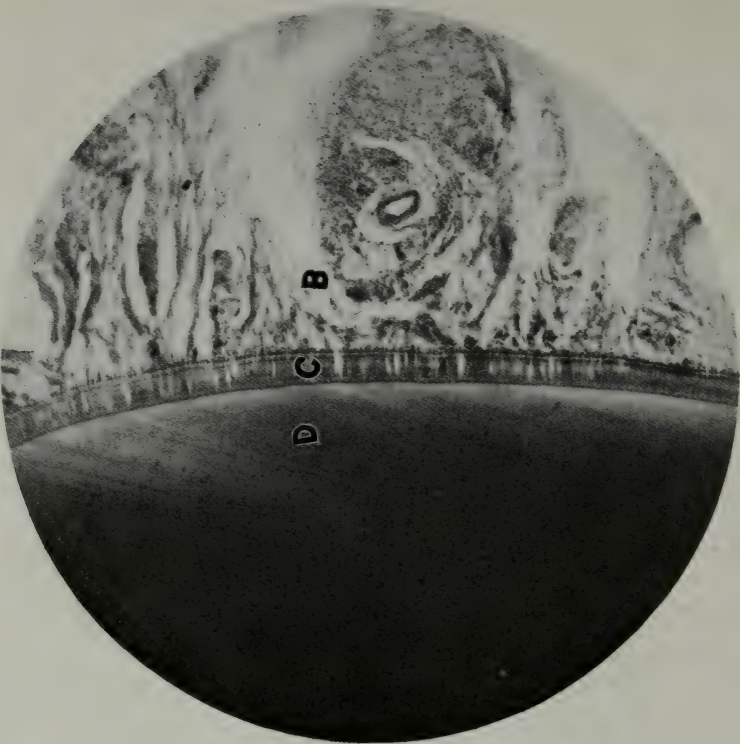


FIG. 8.



(Magn. 36.)

FIG. 9.



(Magn. 65.)

fulfilled. The root has been entirely outlined, the moat has closed up around the entire root, the alveolar process has followed, and is now located at a respectable distance from the root.

Fig. 9 is the cross section of a human bicuspid: *B* is the peridental membrane, *c* the cementum, and *D* the dentin. The fibers of the peridental membrane are

seen penetrating the cementum throughout. It is in this manner of attachment that the peridental membrane has such a tenacity for the root of the tooth. Once destroy this attachment, and the peridental membrane loses its vitality and its hold upon the tooth-root.

31 N. STATE ST.

(To be continued.)

## Systemic Conditions Due to Oral Focal Infection.

### (Case Reports.)

By H. BROWNSTEIN, D.D.S., New Haven, Conn.,

FORMERLY DENTAL SURGEON OF THE U. S. MILITARY COLLEGE OF ORAL SURGERY, FT. OGLETHORPE, GA.; LATE DENTAL INTERNE NEW YORK NOSE, THROAT, AND LUNG HOSPITAL, ORAL SURGERY DEPT.

#### CASE I.

THE patient, a male, thirty-four years of age, was referred to me by a nose specialist, after having been treated for nose trouble for some years without result. The patient had not been able to

An X-ray was taken, and showed abscessed areas around the apices of the roots (Figs. 1 *a*, *b*, and *c*). These teeth were extracted, and each area thoroughly curetted under conduction anesthesia. Three weeks later the patient was able

FIG. 1.



breathe through one side of the nose for more than ten years.

After a thorough examination of the mouth and from the history of the man, I found that the upper four anterior teeth had been treated about fifteen years ago, and four Davis crowns placed over the roots.

to breathe through both nostrils, claiming that the left nostril, which had been blocked up, was clear, and it seemed to him as if a big piece of flesh had been cut out of the nostril.

He gained five pounds during the three weeks, and his general health greatly improved.

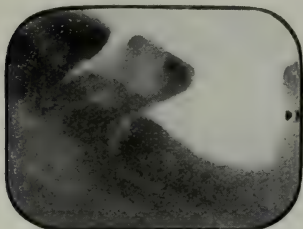


*CASE II.*

The patient, a male of thirty-one years, had had an intermittent pain on

months' treatment, was greatly improved in health, and has had no recurrence of pain in that region.

FIG. 2.



and off for the past two years in the lower left region of the mouth.

An X-ray was taken, and the lower left first molar was found to have an abscessed area, also an impacted lower sec-

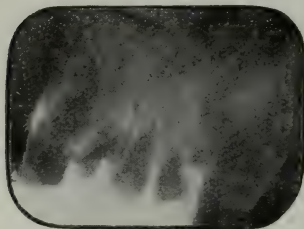
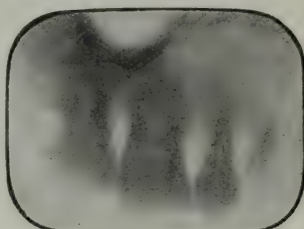
*CASE III.*

Patient, forty-eight years of age, female, had been treated for eye trouble, and was referred to me by an eye specialist. The left eye was completely closed, and the right eye very much irritated and watery all the time. The general health was very poor.

The woman was treated by an eye specialist for two months without any result. X-rays of all the upper teeth were taken, and showed roots with abscessed areas around them, and the remaining teeth pyorrhetic (Figs. 3 *a* and *b*).

All the upper teeth and roots were extracted, and the abscessed areas thor-

FIG. 3.

*a**b*

ond bicuspid was found to be pressing against the mesial root of the molar (Fig. 2).

Both molar and impacted bicuspid were removed, and the abscessed area thoroughly curetted under conduction anesthesia. The patient, after three

oughly curetted under conduction anesthesia. After three weeks of treatment, the patient's left eye was completely opened back to normal, and the irritation of the right eye had ceased. Her health was much improved.

1098 CHAPEL ST.

# The Use of the Modified Baker Anchorage in the Early Treatment of Fractures of the Mandible and Maxilla.

By LEO WINTER, D.D.S., New York City,

DIRECTOR OF THE ORAL SURGERY CLINIC, NEW YORK COLLEGE OF DENTISTRY; VISITING DENTIST, HARLEM HOSPITAL (BELLEVUE AND ALLIED HOSPITALS); CAPTAIN, DENTAL RESERVE CORPS, U. S. ARMY.

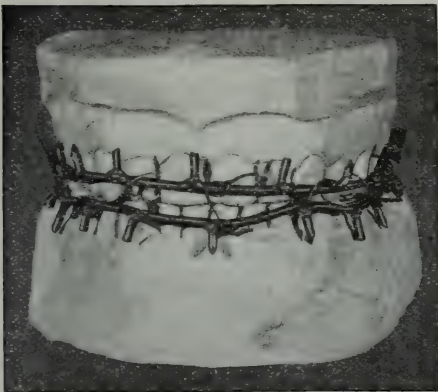
**D**URING the recent war the number of men suffering fractures of the jaws has been appalling. As a natural sequel to the quantity of cases, great advancement has been made over old peace-time methods of handling such patients. The one great step forward, however, has been the adoption of the

No. 6, operating as Head Evacuation Hospital No. 1, Deux Nouds S. W. Verdun, and generally adopted to the ex-

FIG. 1 B.



FIG. 1 A.



Modified Baker Anchorage. This device has been substituted wherever wiring had previously been used immediately after the injury. The results have in all cases been most gratifying.

The French were the first to use the modified Baker anchorage, and my attention was first called to it while serving in the French Maxillo-facial Hospital, of the 14th region in Lyons. Subsequently it was used at Mobile Hospital

clusion of all other methods in the immediate treatment of fractures.

The modified Baker anchorage is a device which accomplishes all that wiring does, with no shortcomings. It consists



of an arch of half-round wire, contoured to the buccal surfaces of the teeth. (Fig. 1.) At distances of one-half inch, lugs are soldered to the arch. For convenience long pieces of this wire may be already at hand with the lugs already in position, and a piece cut the size of the arch. For the upper jaw, the lugs point upward, and are reversed for the lower arch. By means of Angle's brass ligature wire, the respective arch wires, with their lugs attached, are firmly fastened to the teeth. This is done by passing the

exists, and a force greater than that exerted by rubber bands is desired, a

FIG. 3.



FIG. 2.



wire ligatures through the interproximal spaces and binding fast the arch wire to the teeth. Fractured parts are brought into occlusion and fastened to the arch wire. Now, with both wire arches attached to the teeth, strong rubber bands are passed over the lugs of opposing teeth, and the two jaws firmly held together in occlusion. Such rubber bands may be made by cutting off the ends of rubber tubing. These bands are applied wherever traction is desired. Fig. 2 shows a deformity before reduction. Fig. 3 shows the deformity reduced. Fig. 4 shows another view of the appliances in position.

In cases where considerable deformity

double brass wire should be applied and kept in position for twenty-four or forty-

FIG. 4.



eight hours. If a slight deformity still persists, the rubber bands which now

take the place of the bent wire will accomplish the results desired.

Wiring has been the commonly accepted means of immobilizing fractures of the maxillæ. Brass wires were passed through the interproximal spaces of opposing teeth and then interlaced. The jaws were thereby held immovable, and remained in place until the fracture united. The disadvantages and dangers of such a procedure are evident. A strain is constantly present, and there is great discomfort and hardship with the wires in position. It is a hopeless task

to maintain a semblance of cleanliness in the mouth without the removal of the wires. In cases of nausea it is obvious that serious consequences might follow. Many cases are on record of deaths following nausea where the patients' jaws were wired.

With the advent of the modified Baker anchorage the oral surgeon has an ideal method of treating his patient immediately after an injury and I am confident that wiring should be permanently abandoned for this more humane device.

133 WEST 72D ST.

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## A Specific in the Treatment of Vincent's Peridental Angina.

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By LOUIS C. LE ROY, D.D.S., New York, N. Y.

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MUCH more has been written about this peculiar oral infection during the past five years, particularly during the progress of the late war, than appeared in all dental and medical literature during the previous twenty years. The probable reason for this is that the disease assumed much greater importance because of its more frequent occurrence and, too, because of its resistance to prescribed methods of treatment. The reports from many sources coming from the several war zones, British, French, and United States, would indicate that in some places it attained the proportions of an epidemic, incapacitating many troops from active service, and at times the disease was fatal.

Dr. Grieves' article in the September DENTAL COSMOS for 1919 on this same subject, quite fully summarizes the studies of many investigators. The author of that article deserves to be thanked for the collocation of so much data on a subject, the literature of which has been so scattered. The present writer

appreciating Dr. Grieves' efforts feels that a repetition of such data other than is necessary to make this article intelligible would be unwarranted. The tenor of the paper by Dr. Grieves sounds like a challenge to the profession to "come forth" and "do something." No doubt there are others who read and interpreted it in the same way, and as there are some phases of his dealing with the subject with which one may disagree, advantage is taken of the challenge.

Vincent's dental angina, or Vincent's peridental gingivitis, or ulcero-membranous gingivitis, as it has been called, is a local disease or rather the product of a localized bacterial irritation, the dental manifestations of which in the army were wherever practicable assigned to the dentist for treatment. Where it attacked the fauces, it was regarded as being within the province of the medical man—a striking illustration of the overlapping of professional interests. It is not a common disease in private practice and is too frequently mistaken for a



simple malady until its resistance to treatment occasions alarm.

There are two phases of the disease which may influence proper diagnosis, the acute and the chronic; the latter is always the more resistant and deceiving and, because of obscure or mistaken etiology, it has been a stubborn disease to cope with. As a specialist in oral diseases, the writer has seen many cases in the last ten years, but previous to that time but two cases are recalled. Until about seven years ago (September 1912), these cases gave me the usual concern, but at that time a remedy was found which has acted as a specific and completely changed my procedure in the care of such cases.

#### TERMINOLOGY.

If we consider the real facts in the pathology of the disease under consideration, *i.e.*, the dental manifestation of so-called Vincent's angina, a term should be adopted to express the pathology more completely. Quoting from Dr. Grieves' article in the DENTAL COSMOS of September 1919, p. 821, he says:

Since that terminology is most valuable which best expresses the pathology—diseases being best classed by the tissues involved and disturbance of function—Gilmer's term "ulcerous gingivitis" improved by Tunnickliff to "ulcero-membranous gingivitis" appeals to the writer as most exactly describing, clinically, the tissue change.

Toward the end of the same paragraph Dr. Grieves indicates that he is aware of another tissue change, which is invariably associated with periodontal angina, for he says these micro-organisms "rapidly but uniformly invade the periodontal membrane and *alveolar crests*, the tissues and vessels alike becoming *gangrenous*. There is a progressive *necrosis of the alveolus*." (*Italics mine.*)

Gangrene of the soft tissues and necrosis of the alveolus are always associated with the periodontal manifestation of Vincent's angina. A terminology is essential, so why not adopt that "which best expresses the pathology," but ex-

PLICITLY. The peculiar membranous condition of Vincent's periodontal angina is not an ulceration with its pyogenic slough, but a *gangrene* with complete death of the soft tissues involved and also of the alveolus—necrosis. Gangrene is understood to mean mortification or death of a part of the body; it generally involves both soft and hard tissues. To the writer it is an error to term the disease an ulcerative gingivitis. Such a term could and has more properly been applied to pyorrhea alveolaris. When the disease under discussion can be diagnosed as "Vincent's periodontal angina" it has advanced beyond the stage of a gingivitis. If these deductions are well founded, then a better terminology would be one that would express the locality of the disease and the type of pathology, such as gingivo-membranous gangrene.

#### ETIOLOGY.

Most all investigators agree as to the specific bacterial element invariably found accompanying the disease; fusiform B. and spirilla were found to predominate in every case.

To quote from Dr. Grieves' recent article again, he says:

The cause of sporadic Vincent's disease seems to be a mystery. It is quite evident that something acts to raise to a pathogenic point the virulence of the B fusiformis and the spirilla which W. D. Miller described as common mouth forms associated with dental caries. Further laboratory confirmatory work in this direction is needed.

My studies and deductions lead me to believe that the cause of the disease under consideration is not altogether a mystery. Lowered resistance is referred to as a factor but discredited by some. Viewing that as a general term that is true, but lowered resistance is an essential factor in any infectious disease and it undoubtedly paves the way for dental anginas. My investigations convince me that the peculiar symptoms which manifest themselves in periodontal anginas can be ascribed to a distinct cause, and that

we have a clue to that "something which acts to raise to a pathogenic point the virulence of the *B. fusiformis* and *spirilla*." It is an acidosis—not only of the oral secretions but more properly acidosis of the digestive secretions or of the digestive apparatus. This statement is made after many tests and a careful review of the number of cases that have been treated in this office during the past ten years, both men and women.

Acidosis, or a prolonged acidity, of the oral cavity is possible in two different ways at least. One by way of the mouth, esophagus to the stomach; the other by way of the stomach, esophagus to the mouth. Both can and have produced Vincent's (dental) angina, or gingivomembranous gangrene, under my observations and every case of the writer's can be classified as an external or an internal acidosis. Vincent's (dental) angina from internal acidosis is the less common. Such cases are brought about by regurgitation of the contents of the stomach which are always acidulous. Patients who suffer from persistent migraine, who spend days or even weeks in bed having persistent vomiting; migraine with regurgitation from nervous exhaustion, dyspepsia, menstrual disorders, etc., all have been causes of oral acidosis and of Vincent's dental angina—gingivomembranous gangrene. The internal phase of the malady is generally of lower tension than the external. The hygienic habits of these patients are generally better and it therefore cannot be attributed to a filthy oral condition.

The dental anginas from external causes are the most common and are the so-called "trench mouth" of the troops, army and navy. It can be said that those affected are almost invariably of unclean oral habits. An abundant bacterial flora is present with its accompanying gingivitis. Every case of external origin that I have seen smoked inordinately. The acidosis in these cases is first limited as a local hyperemia. It is produced by the burning of tobacco or woody fiber, cigarette tobacco in particular. Some of the chemicals generated

are pyroligneous acid and furfural, an acetic aldehyde. It is not the *use* of cigarettes which induces an acidosis, but the *abuse* of them. The moderate use of tobacco will probably not produce a dental angina, but *inordinate* cigarette smoking will do so and was the habit of practically every case of dental angina from external causes the writer has treated. The almost constant bathing of the oral parieties with acidulous substances, the ingesting of the same which increases gastro-intestinal acidity and in turn has its effect upon the salivary secretions, inducing salivation, is one of the diagnostic symptoms of the disease.

The foregoing assertion is not intended to convey the idea that Vincent's disease cannot be *acquired*, for its contagious character seems to have been definitely attested by Kellerman, Grieves, and others. The inordinate use of cigarette tobacco by the soldiers and sailors in the late war and the epidemic prevalence of the disease have special significance. Men who never smoked before or who infrequently smoked were encouraged to smoke cigarettes. Immense funds were collected for that purpose. The various organizations in the field sold to the boys or gave to them when they could not pay, packages by the million. There is some element in the cigarette besides being a mere habit-forming agent which exerts a pernicious effect upon the health of the individual. Added to this was the lack of hygienic facilities, oral in particular. Men who were at the front have told me that it was a common practice and that they saved and used fruit and vegetable skins in an effort to relieve their oral discomfort.

#### TREATMENT.

It does not seem essential to outline at this time the course of experiments that led to the writer's findings. Many remedial agents were tried, all of which proved futile as cures; all had limiting properties, either too caustic, irritating, destructive or evanescent, the latter because of the neutralizing effect of the saliva, which limits the effects of all



fluid drugs used in the oral cavity. Many of the remedies used in treating this disease seem to accentuate the inflammation. Dakin's solutions were the only promising ones.

No surgical procedure should be attempted for the patient until the disease is under control. No lancing or cutting away of tissue, no extractions, no root-canal work, nothing that may induce deeper infection. This statement is inserted to corroborate the opinions of other writers and to give emphasis to them, because of its importance. To do so would be introducing into the deeper areas a gangrenous or necrotic substance or to have absorbed by the opened vessels these extremely virulent micro-organisms or toxins which might aggravate a general septicemia, which it must be said is always imminent in angina conditions, acute or chronic, and thus endanger the patient's chances of recovery.

But some of the filth and adhesions which accumulated through inability to properly clean the teeth since the onset of inflammatory symptoms must be dislodged. Decomposed macerated food debris held in place by a subnormal viscid saliva should be removed. Sprays are the most valuable here, using Dakin's dichloramin-T water solution quite warm, or hydrogen peroxid, or even a warm saline solution without too much pressure (10 lb.). Very careful instrumentation to dislodge the adhesive particles or the gangrenous membranous shreds, carefully but expeditiously, must be attempted. Then pack very loosely each affected interdental space with cotton saturated with Dakin's dichloramin-T oil solution, 2 per cent., freshly made, which, by the way, has been the best remedial agent for this disease in the writer's hands. This should be repeated several times in twenty-four hours, or until each affected interdental space can be blocked out; intelligent patients can do that for themselves; then instruct the patient to irrigate the mouth each hour or so with Dakin's dichloramin-T water solution, 2 per cent., cool, or peroxid of hydrogen. At this stage of the treatment the "specific" remedy should be

applied, namely, black oxyphosphate of copper cement.

If many interdental spaces are affected it will require considerable time to apply the cement to all spaces; the resistance of the patient is generally quite low, so that too much should not be attempted at one time, but after several hours' rest, or the next day, continue with the plastic treatment until all interdental areas are protected. Note the situations that have suffered the most from the destructive influences of the disease and proceed with those first. With cotton rolls isolate the tooth or teeth, absorb the moisture carefully, making no attempt to dry the surfaces completely.

A decidedly creamy mix should be made, but should not be used after it has begun to "set" or lost its stickiness. The cement is carried with a blunt-pointed explorer to the affected interdental spaces, which should be closed completely and rapidly with the soft cement, using no pressure. Work carefully so that there will be if possible no excess of cement to remove after it has hardened, which it does in about thirty seconds. The cement crystallizes so quickly that it is not advisable to attempt to close more than two or three spaces with a mix, which makes it a slow process where there are many interdental spaces to operate upon. Caution should be used not to leave rough edges or points on the cement to lacerate cheeks or tongue. It is difficult to see unevenness on such intensely black surfaces as the cement presents.

The germicidal property of copper phosphate cement is so well understood that it is unnecessary to offer assurances of its therapeutic value. What does not seem to be understood so well is its adhesiveness. It adheres tenaciously to perfectly smooth tooth surfaces and is as difficult to remove from such surfaces as calcareous deposits. At some later day after the disease has been eradicated, the cement may be removed, a very thin separating saw being used to divide the mass, or the edges may be trimmed and the surface material left to protect the

tooth surfaces indefinitely, not necessarily against reinfection from angina, but against caries of the cementum, for when the malady has been cured extensive cementum areas often will be found completely exposed. Such surfaces are liable to carious disintegration in time unless very thorough and frequent prophylactic care is adopted and faithfully continued.

The foregoing describes the *modus operandi* for the acute form of the disease. Treatment of chronic cases differs somewhat.

At times there is a true necrosis left as an aftermath following the suppression of the gingivo-gangrenous symptoms. These areas should receive surgical care. The chronic phase often has a pyorrhetic involvement with its accompanying calculus. The copper phosphate is used in these cases as well to control the gangrenous symptoms, but must be removed subsequently to facilitate treatment for pyorrhea. Frequently a deep-seated necrosis will persist which it is inadvisable to attempt to control without sacrificing the tooth or teeth involved.

During the seven years that the writer has used oxyphosphate of copper cement for the purpose outlined, many cases of Vincent's peridental disease have been treated in the way prescribed. It has

invariably caused the malady to disappear (destroyed the micro-organisms) wherever the cement came in contact with the tissue *and no reinfection of that area occurs*, so that he feels justified in designating the remedy a specific.

Although several years have elapsed since the writer first successfully applied in his practice this remedy for the control of the disease, a contribution of the facts to the literature on the subject has been deferred, because treatment by the method described requires certain definite dental technique and considerable time to perform. In an effort to simplify the procedure, experiments have been kept up, but the results have not been reported in the expectation that, since so many were working on cases in the war zone with unusual opportunities for observation, someone would advance a medicinal formula that would control the symptoms promptly and bring about a cure and one that could be more readily used to relieve the great numbers who were suffering from this enervating disorder.

If this article will stimulate investigation as to the possibility of the use of other remedial agents which will produce the desired therapeutic effects in the oral cavity in a more simplified manner, its purpose will have been served.

38 W. 50TH ST.



## CORRESPONDENCE

### "Vincent's Angina."

TO THE EDITOR OF THE DENTAL COSMOS:

*Sir*,—I have been very much interested in reading the different articles concerning Vincent's angina, so-called, and the various ways of treating it. In the base hospital in France to which I was attached we treated a great many cases, and while some phases of our treatment would not meet with the approval of many of the writers, it got results quickly and easily.

Our treatment was very simple. The first step was to rid the mouth of all broken-down roots and infected teeth, if any, followed by a thorough scaling and polishing of the teeth, just as much being done at the first sitting as possible. No harm was done by removing sloughing gum tissue. The teeth were then isolated by packing the mouth with large wads of absorbent cotton. With a blunt silver probe, sodium perborate was worked around the teeth, well under the free margin of the gums, using the dry powder, the blood acting as a solvent for the powder. The powdered sodium perborate would be applied every day until a negative report came from the laboratory. Then if the gums showed improvement, the perborate would be discontinued, and tincture of iodine would be applied daily on the dry gums, packing the mouth with cotton as before. Patients were instructed to keep the mouth and teeth thoroughly clean, and to use peroxid of hydrogen mouthwash freely.

Treatments were given daily following laboratory examination. Following the first treatment, there was invariably a marked lessening in the activity of the organisms present. The spirochetes under a dark field showed but little motion. There was also a marked diminu-

tion in numbers of both the *B. fusiformis* and the spirochetes. The two forms of bacteria existing together would seem to confirm the theory of some bacteriologists that the spirochete is really the *B. fusiformis* at one stage of its development, as they were rarely ever seen separately. In almost every case, negative reports were received from the laboratory after three or four treatments, even in old chronic cases and in the very worst acute cases.

Following the very first treatment the characteristic odor would disappear, the patients were relieved of all pain, the gums began to acquire a healthy appearance, and loosened teeth became firm. No disastrous effects were observed from this treatment, and, without exception, patients were ready for discharge in from seven to ten days—just as soon as three successive negative reports were received and the mouth was well. Cases were, of course, often observed for a much longer time, but no recurrences were noted, excepting where there was some definite source, usually a common drinking-cup. None of the usual methods of treatment were used. Silver nitrate and chromic acid were not to be compared with the sodium perborate. When the occasion demanded it, some stubborn patch was treated with a little trichloroacetic acid, but even this was used but little, the sodium perborate being so satisfactory.

So far as I know, this method was first used by Dr. W. J. Scruton of Oklahoma, formerly of the Dental Corps, and to him belongs the credit.

Sincerely,

NORVAL H. McDONALD, D.D.S.

904 N. CHARLES ST., BALTIMORE, Md.

# PROCEEDINGS OF SOCIETIES

## Missouri State Dental Association.

Annual Meeting, St. Louis, Mo., April 14, 15, and 16, 1919.

(Continued from October 1919, vol. lxi, p. 1025.)

### WEDNESDAY—*Morning Session.*

The meeting convened at 10.15 A.M., Dr. H. F. D'Oench, president of the association, in the chair, and Dr. J. F. Wallace, acting as secretary.

THE PRESIDENT. The first order of business will be the reading of the minutes of our last meeting.

Secretary Wallace read the minutes of previous meeting.

THE PRESIDENT. If there are no alterations or corrections, the minutes will stand approved as read. (No alterations entered.)

THE PRESIDENT. Are there any reports or announcements to be read?

Dr. HAGEMANN. Your Committee on Resolutions, relative to the Kansas State Dental Association, is ready to report, and we have adopted the resolutions as herewith submitted for your approval:

*Whereas*, the dates of the meetings of the Kansas State Dental Association and the Missouri State Dental Association were set for the same days, without mutual knowledge of this fact; and

*Whereas*, such a conflict of dates would accrue to the detriment of each; and

*Whereas*, the Kansas State Dental Association, upon request from the Missouri State Dental Association, in a fraternal and magnanimous spirit, and at the expense of much labor and inconvenience, postponed the dates of its meeting; therefore be it

RESOLVED, That the Missouri State Dental Association at this time wishes to express

its deep feeling of appreciation and gratitude to the Kansas State Dental Association for its magnanimous action in postponing the date of its meeting; and be it further

RESOLVED, That we extend our best wishes for the success of the coming Kansas meeting.

Dr. FULKERSON. Mr. President, I move the adoption of these resolutions. (Motion unanimously carried.)

THE PRESIDENT. The next order of business will be the reading of the President's Address.

The incoming president, Dr. Chas. W. Digges, assumed the chair while Dr. D'Oench read the following address:

### President's Address.

By H. F. D'OENCH, D.D.S., St. Louis, Mo.

*Mr. Chairman, honored guests, ladies and gentlemen.*—First of all, I desire to express to you my deep appreciation of the honor conferred upon me by making me your executive officer. It is indeed no small thing to have been given the privilege of serving you in this capacity during the past twelve months.

Our profession is rapidly rising to a realization of its great responsibilities to the public, through the general recognition, by the public and the medical profession, of the intimate relationship which exists between oral pathological conditions and general diseases. The laity demands of us also a much higher



degree of perfection in the various operations which we are called upon to perform. This resultant prestige which we, as a profession, have attained, must be enhanced. With these thoughts in mind we entered upon our duties, and attempted an analysis of the conditions, intellectual and physical, of the association as a whole and its constituent societies. After our survey, we were even more deeply impressed with our responsibilities than with the honor of this exalted position.

#### MEMBERSHIP.

As stated upon the occasion of our inauguration at Columbia, last April, the State Association is not truly representative of the profession unless it contains within its membership at least fifty per cent. of the practicing dentists within its borders. As examples of weakness in local societies, we found in one case a society of thirty-one members with seventeen in arrears and ninety-six available non-members; in another district sixteen members, four in arrears, and fifty available non-members; a third district of twenty-five members, ten in arrears, and engaged in a controversy threatening the extinction of the society. Springfield, Kansas City, and St. Louis, in which monthly meetings are held, showed highest efficiency. With two thousand practicing dentists in Missouri, we inaugurated the campaign for ten hundred and fifty members of our association by April. The result of this campaign you have found on pages 4 and 5 of your programs. We are pleased to announce a total membership to date of eleven hundred members.

This result was made possible by the untiring efforts of the various local officers, supplemented by the enthusiastic co-operation of your state secretary. The officers of the North Central, Dr. Harris, secretary, Dr. L. C. Cleveland, president, together with your vice-president, Dr. Charles Digges, have the unprecedented honor of creating a paid-up membership of one hundred and one per cent. Kansas City, Springfield, and St.

Louis also deserve credit for filling or surpassing the quotas assigned. The experience of neighboring states has been that local societies holding more than one meeting per year have been far more successful than those holding but one. Of those having no meeting, the least said will be most eloquent.

In order that this membership may be maintained, it becomes necessary to hold the interest and attendance at local meetings by preparing attractive programs. For this purpose we have prepared and presented to various district officers lists of available talent in most districts, and recommend that an interchange of Missouri talent be called upon at future district meetings. We further recommend that the State Association allow a sum not to exceed twenty dollars to defray the expense of transportation, etc., of not more than one intra-state essayist or clinician for each district within the year. We strongly maintain that the duty of the officers of this association is not alone that of preparing an acceptable program for the annual meeting, but also to encourage the various component societies to function to the fullest capacity for their own and the public welfare.

For the purpose of strengthening the association, we recommend the consolidation of the treasurer's office with that of the secretary, the secretary-treasurer to be, in fact, the *ad-interim* manager of the association and editor of the *Bulletin*. The *Bulletin* to be issued in the late fall (October or November), and again in January or February, and to record the activities of the component societies, etc. At present the component societies are isolated, and in ignorance of the activities of neighboring societies. The secretary-treasurer should be paid a salary sufficient to enable him to pay a competent clerk. We recommend 15 per cent. of the membership dues paid in as an equitable sum.

#### THE DENTAL HYGIENIST.

As guardians of the vestibule through which most diseases enter the system,

we have, through various methods of propaganda, aroused the public to an appreciation of the value of preventive dentistry. The great demand for our services finds us handicapped here in Missouri, by lack of the assistance of the dental nurse or oral hygienist.

We have requested our Committee on Legislation to investigate and report upon the advisability of modifying the state law, or to have the Board of Dental Examiners make a ruling which will enable colleges or other organizations to take on the training of such persons as may be qualified. The practice of such dental nurses to be rigidly limited by law to the services implied by their title.

#### HONORARIA FOR ESSAYISTS AND CLINICIANS.

Now, to discuss for a moment the growing tendency to commercialize, to destroy that high professional ideal to which we have consistently aimed in the past. We refer to the practice of our fellows of the profession demanding a fee when called upon for a lecture or clinic before a dental society. We most emphatically condemn this practice as being beneath the dignity and ethical standards of a professional body or individual, to either offer or to accept a fee when called upon for information relative to humanitarian service. As a precedent for our position, we cite that the medical and legal professions are astounded that such demands are either made or accepted. We request that this association express, by resolution, its attitude upon this subject.

We are proud that our guests of honor, who have so ably clinicked during these two days, have been actuated by the highest professional standards, and have not in any instance required an honorarium. We have been honored indeed by their generous and painstaking efforts in our behalf, and we know that their contribution to our knowledge will leave an impress upon our minds which will be an inspiration and incentive to all our members to work to greater achievement in the various branches demonstrated. It is with cordiality and sincerity that I

express to our clinicians the thanks of our members.

The success of this meeting—the quality of which we leave to your judgment—has been entirely due to the hearty co-operation of a group of splendid fellows who have worked strenuously and faithfully to advance the status of the profession; not alone for this meeting but also upon previous occasions.

The “out-of-the-city” committeemen were selected on account of their proven fitness. The local men have long enjoyed a unanimity of purpose, a mutual appreciation and understanding which has made of them a unit of force in whatever they elect to accomplish. To these various committees I owe a debt of gratitude for which the mere expression of my personal thanks seems entirely inadequate. On one occasion I told Dr. Wallace I was sorry to push him so hard, and in his reply to my letter he said he wondered whether there was a limit to which a button could be pressed.

The question is, Is this association functioning to its full capacity? Are our component societies simply to fill the membership list, or will they meet often and develop their men? Are our colleges to be continually classed B and A plus? Are we producing a quota of men of national reputation equaling that of other states?

Once again I want to thank you, gentlemen, for the privilege of serving you. My one regret is that I have not served you so well as I had hoped to. I thank you.

Dr. DIGGES. On account of the fact of the president's address coming later in the program than it has formerly, it was necessary to appoint a committee in advance, and let them read his address in order to make their report at this time. The committee that has been appointed is Dr. Thompson, Dr. Arnold, and Dr. Sugg. Dr. Thompson will read the report of the committee.

#### REPORT OF THE COMMITTEE ON PRESIDENT'S ADDRESS.

*Mr. President and members of the Missouri State Dental Association,—Your Com-*



mittee on President's address beg leave to submit the following report:

We heartily approve and concur in the recommendations and suggestions as offered by the President in his address, and we wish to call to the attention of the association the following points in particular:

First, the remarkable increase in membership as told you by him reveals nearly, if not quite, eleven hundred members, which against the membership of last year of eight hundred and nine, shows practically a gain of three hundred members, which result is largely due to the energetic and untiring efforts of your retiring president.

We believe that his recommendation in regard to the State Association being of more service to the component societies is a good one, and that financial assistance should be rendered to the local societies along the lines suggested.

There is a reason for combining the offices of secretary and treasurer, and we believe that a *Bulletin* should be published containing the proceedings of the State and component societies.

The president condemns the practice of dentists accepting a fee for giving a lecture, reading a paper, or giving a clinic, and asks for an expression from the State Association. We feel that this association should express itself by resolution as so requested.

The association owes a debt of gratitude to the retiring president and his efficient Program Committee in getting such eminent men as have appeared before you at this meeting without honorarium.

Respectfully submitted,

A. J. THOMPSON,  
T. W. ARNOLD,  
THOS. J. SUGG,  
*Committee.*

Dr. THOMPSON. Mr. President, I move you that the report be adopted as read. (Motion carried.)

President D'Oench resumed the chair.

THE PRESIDENT. The next order of business is the Report of the Committee on Science and Literature, by Dr. E. G. Schmitt of Springfield, Mo.

Dr. SCHMITT. *Mr. President, members of the Missouri State Dental Association, ladies and gentlemen,*—Before reading this report there are a few words that I would like to say in regard to

dental science and literature in the State of Missouri, and I want you all in the different districts to take it home with you.

How can you expect to advance dental science in your state unless you have meetings in your district societies? In looking over the program I was surprised to see that a number of districts did not meet during the year. How can you exchange views and ideas and advance your professional well-being if you do not get together and talk things over? I hope that when we, from the different districts, go home we will bring this matter before our local men and get together, start something, and when we come back here next year, or go to Kansas City or wherever the meeting may be, instead of having six or seven hundred, we shall have one thousand members present.

A great deal of credit is due to our president for the meeting that we have had this year, and there is no doubt that this meeting will go on record as an advancement to the science in the entire United States. I am not going to keep you long. You are all tired, you have had a few hard days of it, and especially last night, so my report will be rather brief, and I will finish it as soon as I can.

Dr. SCHMITT then read the report of Committee on Science and Literature.

[This report is published in full at page 976 of the October issue of the DENTAL COSMOS.]

THE PRESIDENT. I purposely refrained from making any complimentary remarks about our committee, for the reason that I knew he would speak for himself. In behalf of the members, I wish to express thanks for this scholarly address, this inspiring talk to lead us on and keep the beacon light of idealism before our men. In arranging our program, making it a clinic meeting, we expressly thought to put Dr. Schmitt in this position, because we wanted to have on the program for the closing remarks one whose words would be of this lofty character.

THE PRESIDENT. The next order of business is a report from the State Board

of Dental Examiners by Dr. T E. Purcell.

Dr. PURCELL. *Mr. President and members of the Missouri State Dental Association*,—Dr. Miller asked me to make a report for the State Board of Dental Examiners, and I would like to say, incidentally, Mr. President, that it is my opinion that one of the orders of business of the State Society should be a report from the State Board of Examiners. I would suggest that to your incoming president.

I would suggest also that the State Board of Dental Examiners are the servants of the State Dental Society, in that we are charged with the responsibility of trying to see that the law is not being violated, and we feel that possibly a great many of the members of the society do not come in contact with the members of the board often enough to know whether or not they are trying to do their duty.

The State Board of Examiners, in the past several years that I have been a member, have been busy trying to see that the law was not violated, and have seen it violated on every side. I want to assure those of you who feel that possibly the board has not been trying to do their duty, that the law is not being violated because of the board, but in spite of the board.

We have the condition existing in Missouri, in the western part of the state, in Kansas City, where we have the most flagrant advertisers in the state or in the United States, and the letter read a moment ago by your secretary probably explains why the flagrant advertising in Kansas City has been kept up to this extent. I say that probably explains it, but I am not sure it does.

Dr. Turner, who was a member of this society at the time of his death and president-elect, had succeeded in getting conditions in shape in St. Louis, so you do not have here the advertisers that we have in Kansas City. I asked the dean of one of your dental colleges why we had such flagrant advertisers in Kansas City and you did not have them in St.

Louis, but his explanation did not explain it to me, because I am a loyal Kansas Cityan. He said that St. Louis had progressed beyond that stage, and we in Kansas City were rather a young city, and that in time to come we would learn better. I hope that is true.

I want to draw your attention to the fact that in St. Louis you have a number of advertisers, but I will leave it to the members that you have not a decent advertising office in St. Louis; you have run-down offices, they are not up-to-date or modern, and you have not a well-equipped office in the city run by an advertiser, whereas in Kansas City we have the best equipped or as well equipped offices as any other offices, and we have snappy men who could make a success of private practice if they would try it. We have succeeded in reforming quite a number of them that have up-to-date equipment. I do not believe it is because Kansas City has not progressed. I believe Kansas City has progressed beyond St. Louis, and you may have the advertiser in St. Louis yet.

Now, gentlemen, we have tried hard to do our duty. We have revoked licenses, we have reformed men, we have prosecuted men, we had a commissioner appointed from the Supreme Court when they took us to that court. We members of the board have spent weeks away from our offices and away from our practices, and we receive the munificent fee of five dollars a day when we are working, so the salary or *per diem* is not very attractive, but we have tried to do the very best we could.

Now, I wish I might touch on the President's address, if you will allow me. The suggestion was made by your president that the matter of dental nurses should be taken up by the State Dental Board. The matter has been taken up, and we would like to see the time come when we would have dental nurses in St. Louis and in Missouri, but they passed such an amendment to their law in New York and are now in trouble over it, so we would like to see the outcome there before we take any further action.



But the particular thing in the President's address is the suggestion, "Are we always going to have Class B schools in Missouri?" I want to call your attention to the fact that the classification of the schools by the board is an arbitrary classification, absolutely arbitrary. I maintain that in the State of Missouri we have dental colleges, we have B Class schools that are superior in every respect to Class A schools that have been classed by this committee. This committee had no standard to go by, and it got to be so arbitrary that we had a fight in Chicago last year; so arbitrary that I asked the question that possibly if a dean of a dental college did not part his hair in the middle he would have a Class B school. The classification is not standardized. The fact that we have Class B schools is not a reflection, because they turned out as good men as there are in the United States.

The one trouble with the people generally, and that applies to the dental profession as well, is that we seem to have the impression that the present age has gotten the sum total of all the learning in the past brought up to us, and we are going on in advance of that line. The same is not true; educators will tell you that at the beginning of the eighteenth century education had reached the lowest ebb in history, that it had fallen down to the lowest standard of any time since history has been recorded. So we have not got the sum total of all the education of the past.

Now, I am leading up to this point, the matter of entrance requirements to dental colleges, which comes under our supervision. We have a four-year course in the dental college today, and we heard a statement the other night by Dr. Maves that he hoped we would have a five-year course. Some educators are suggesting that we require an A.B. degree. In England what is the condition? We have in England the dental prosthetist, who is not a dental graduate; all he has to do is go to a laboratory and make the plate—the dentist does not do anything at all. What are we coming to if we require a five-year college course?

You heard the other day, at the beginning of our session, about our public clinics. We are coming back to good socialistic ideals where the poor are going to be taken care of by the state, and we are tending in this country to an aristocracy of education. Gentlemen, there are only six per cent. of the people in the United States that attend the high schools. Look over the record of the Missouri State Dental Society, and tell me if the men who have brought the profession up to where it is today are high-school graduates; many are not dental graduates even.

The mere fact that a man has an A.B. degree does not mean that he thinks, and Dr. Maves told you that the trouble with educators was that they could not get people to think, and the fact that you stuff a man like you would a bologna sausage does not mean that you have taught him to think. Our standards of education have gotten to where the people are not going to get dental services. The man with an A.B. degree, after spending four years in college, and five years in a dental college, is not going to go down to a town in the Ozarks and practice dentistry. Then what are we going to do for dentists? Is there a man in this society who does not know that we have not enough dentists today to take care of the needs of the people? What is going to become of the dental profession if you are going to require an A.B. degree, or even a four-year high-school course?

Let us go back to the mother of all professions, the law. We have Columbia, Harvard, and Yale with their law schools, but we have in Kansas City a school of law that has night sessions, and a man can get an education and graduate in law by attending this school at night and working during the day. Has the mother of all professions closed the door? Not at all.

Gentlemen, we do not want an educational aristocracy in this country to the point where we are going to be able to select our dentists from six per cent. of the population. We are drifting gradually from one extreme to the other.

The time was, fifty years ago, when the men who practiced dentistry very largely extracted teeth and made plates; and then came what I shall term the jeweler's period. We had expert gold workmen, wonderful types of men that did wonderful things, and we began to have bridge work developed to an extreme that was remarkable.

Then in the dental profession—and with all due courtesy to them I say it—came the mercenary idea, and we began to save roots and stumps of teeth to construct beautiful bridge work, because they meant dollars and cents. Today we have the pyorrhea specialists and the serum methods of curing, and today the profession has come back to what Dr. Patterson taught thirty years ago, that tartasol is the only thing for pyorrhea.

Now, Mr. President, I have gotten away from the Report of the State Board of Dental Examiners, but we have to stop and think that the general public are deserving of dental service, and the general public come from the grass roots. Where does your successful business man in St. Louis come from today? You will find a great many of them came from the farm. We are going to make it impossible for the general public to get dental service.

You are talking about establishing public clinics. Why is it necessary? Because you are raising the standard to where a man spending nine or ten years in acquiring his education cannot afford to practice for the poor. It is time that we called a halt. How in the name of common sense do you expect to keep men from practicing unethically when you have the standard raised so high that the ordinary man cannot afford it? When a root specialist will charge fifty dollars for filling a root, what is the poor man going to do? What is the submerged one-half going to do for dental service if you get such men that have gotten the education and the efficiency so important and so necessary that they had to spend ten or fifteen years of their life to get it, and so cannot practice for the general public that are deserving of our care?

We must not talk about public clinics for the poor. We are harking back to the aristocracy in Europe that was harked down by the present war. We are our brother's keeper. Four years ago, in a little town in the middle of Servia somewhere, a man was killed—we did not know him, we had never heard of him, but because that man was killed, this morning while we are in session there are seventy-five thousand American boys buried in France, and two hundred thousand are back in this country wounded and crippled.

Because we are our brother's keeper we must not forget the fact that we are successful professional men, and there are people in this world who are deserving of dental service but cannot pay for it. We must not talk about the state taking care of them. Let us stop for a moment, and think: It is very nice for us to come here and say we must raise our standards. We are members of a noble profession, but when you are raising them, what are you doing to the common people? They are the ones to look after. The rich man can get any kind of service he wants, but what about the poor fellow? You will give him the dental clinic, the public clinic? No you won't, because you will have the Bolsheviks in this country.

Now, we dental board men cannot absolutely prevent the advertiser from having advertising offices in Missouri, so long as you drive people away from having your dental service. You are leaving the best chance in the world for the advertiser to flourish because you are doing that. I do not decry education. No, not by any means, but we must not shut the door to the poor people. Today in Kansas City the office to which this gentleman refers is making a profit of twenty thousand dollars a year; we saw the books, and they are doing an enormous amount of work, and paying five operators. Do you recognize the fact that that is going to be a hard place to close? We have had the best legal men at work on this, but the advertisers too have good legal talent; they have the



money to pay for it, and they have a certain newspaper in Kansas City behind them.

Do not blame the dental board because you see advertisements in the newspapers, flagrant violations of the dental laws. Your dental board is trying the very best they can, and they need the co-operation of every man in the State Dental Association. We need your moral support, we need your assistance in offering suggestions, and we need you also to show us where you find violations of the law. Do not criticize the dental board because there are advertisers in the State of Missouri, for we are doing the best we can. I thank you.

Dr. McCUE. We have won our fight so far. We have revoked ten or fifteen licenses in the state, we have prosecuted Acme and Wolff in Kansas City, and revoked their licenses. They were tried in the circuit court of Kansas City for practicing dentistry without a license, and Dr. Acme went to Iowa. His bond was forfeited to the amount of five hundred dollars, and Dr. Wolff was prosecuted, and the judge said, "I won't send him to jail this time." Indicating that he might if he again found him guilty.

THE PRESIDENT. I think you will all agree that we have a live and thoroughly interested state board.

I maintain that the profession is as great as its leaders, it is as great as the idealists at the top; also that the middle half and the submerged tenth will always be with us, that in organizations of this kind we must have the very highest ideals of manhood and courage to fight the devil on every hand. That has nothing to do, of course, with what our state board has to say. We cannot go into that. But I want to congratulate the members on the quality of the man they have chosen to represent them for the next year. He has been called the "human dynamo." I know that he will create in the Missouri State Dental Association a far superior quality to that which we have had this year. We shall require that of him. I shall appoint Dr. Robb and Dr. Whitmer to escort the newly-elected president to the chair.

Dr. Chas. W. Digges, president-elect, was escorted to the chair.

Dr. D'OENCH. It is with great pleasure that I hand over the gavel of this organization to my successor, Dr. Digges.

Dr. DIGGES. Gentlemen, it is useless for me to say to you that I appreciate very much indeed the honor and the privilege of serving you for this coming year as the president of this association. I trust that my ability will be such that next year we may have a meeting that will equal this, the most wonderful meeting that we have had in the history of our state, that Dr. D'Oench has staged here.

I will be willing to work and do anything in my power to bring it about, and when you men whom I am going to appoint on my different committees are placed I am going to expect you to work, and, as Dr. D'Oench has said, I am going to push the button to the limit.

Again I want to thank you for the honor that you have bestowed upon me in electing me president of this association.

Dr. J. F. Wallace, newly-elected vice-president, was escorted to the platform.

Dr. WALLACE. I have just a little inclination to tell you that I do not propose to thank you for the honor you have conferred upon me. If I were honest with you I would tell you that the only reason I am here in your presence this morning, as vice-president of the State Society, is because you willed it upon me, and not because I seek it or desire it. But it has been my disposition, rather my pleasure, to do that which the Missouri State Dental Association has wished me to do from the time I first entered into the organization.

Since it is your pleasure or your desire that I serve you as vice-president, I promise you it will be my pleasure to serve in that capacity to the best of my ability. I know of no other function that the vice-president has, except to stand back and see whether or not the president is pushing the button. I will be there to see that the president pushes

it, and when he doesn't push it, if I can get to it I will push it. So if any of you men lose out in getting a job the coming year, I am going to try to see if I cannot find something for you to do.

I thank you very kindly, and hope that the present administration, which I shall do the best I can to assist, will make a better success and a greater meeting at

its 1920 session than ever in our history. It is possible, and I believe will be accomplished.

THE PRESIDENT. Is there any other business to come before this meeting? (No response.)

A motion was made to adjourn, duly seconded and unanimously carried.

The society then adjourned.

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## Dental Society of the State of New York.

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Fifty-first Annual Meeting, held at Syracuse, N. Y., June 12, 13, and 14, 1919.

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(Continued from vol. Ixi, page 1248.)

### FRIDAY—Afternoon Session.

THE meeting was called to order at 2.15 P.M. by the president, Dr. Beach.

#### Clinical Lectures and Demonstrations.

The first item on the program was a clinical lecture by Dr. H. S. Dunning of New York, as follows:

1. THE EXTRACTION OF IMPACTED AND NON-ERUPTED TEETH. (Dr. H. S. DUNNING, New York.)

#### DEFINITION OF TERMS.

The term "impacted" indicates the condition of a tooth which has become so embedded or wedged in between the contiguous structures as to prevent its eruption. These teeth may be wedged between dense bone and other teeth as is most often seen in the region of the ramus of the mandible, and the tuberosity of the maxillæ. They may occur in other localities, however, and may be held in by dense fibrous tissue.

An unerupted tooth is one which is covered or embedded in its contiguous structures, but has not been prevented from

erupting by any definite obstruction like bone or tooth or even soft tissues. An unerupted tooth lies in its abnormal submerged position because for some reason nature has not applied the necessary force to erupt it.

An impacted tooth cannot come into its own even if nature does exert the proper force because it is prevented by a hard barrier, such as bone or teeth.

The terms impacted and non-erupted are frequently used improperly, and often the practitioner has not a clear conception of the meanings of the two terms as applied to teeth. There are pressure and obstruction in the one case; no pressure or erupting force and no obstruction in the other.

*Causes of impacted teeth:* Lack of development of the mandible and late dentition of the third molar.

*Causes of non-erupted teeth:* Lack of development and lack of erupting force; malnutrition.

*Frequency of certain teeth toward impaction:* Third molars, upper and lower, bicusps and canines.

*Frequency of certain teeth to non-eruption:* Upper canines most frequently; molars.



## TREATMENT, DIAGNOSIS, CLASSIFICATION.

The treatment of both these conditions is generally best carried out by the early removal of the teeth involved. There are certain cases, principally in the anterior portion of the jaws, where these teeth can be exposed surgically and can then be brought into their normal position by orthodontic measures. This procedure should be followed when

1. The impacted or non-erupted teeth will be of great service to the patient.

2. This procedure will not be of long duration and too much strain to the patient.

*Diagnosis. Clinical Examination and X-ray.* The removal of the teeth is a surgical operation and must always be considered as such, and the operator should prepare for it by having extra instruments and supplies ready. The operator must decide in the beginning whether the case is a hospital one or an office case. Whether general or local anesthesia should be used. If an office case, local anesthesia should always be used; preferably *novocain* by the mucous, submucous, or conduction methods. A word of warning here, "Do not try to do too big stunts in your office." If the patient ought to go to a hospital, have the courage to refuse to operate in your office. Rather underestimate your ability to operate in your office under local anesthesia, than see how far you can go; with a conscious patient you and your patient will be better friends after it is all over. Do not do any operating with local anesthesia that requires over one hour and a half, if you can help. An hour is a better time.

*Symptoms of impacted teeth: Subjective.* Pain of many different kinds. Neuralgia. Referred pain. Nervousness. Insomnia. Sore throat, etc. *Objective.* Clinical, perhaps nothing but red gums. Crown of tooth extending from under gums.

*Symptoms of non-erupted teeth: Subjective.* Generally none. *Objective.* Radiographic only. Perhaps slight tumor or swelling of gum. Perhaps small sinus of gum.

## 2. CONDUCTION ANESTHESIA. (Dr. M. I. SCHAMBERG, New York.)

Dr. Schamberg gave an illustrated talk on the extra-oral methods of producing conduction anesthesia.

## 3. CLASP DENTURES. (Dr. EDWARD KENNEDY, New York.)

Before taking up the subject of clasp dentures which the Committee has assigned to me, I want to make a few general statements regarding bridge work.

In the light of our present knowledge of focal infections, there has been a call for the extraction of all abscessed teeth and some substitute must be provided. If we replace these teeth with fixed bridge work and devitalize other teeth to support this bridge work, we are only inviting a return of the abscessed condition, unless we have a method of treating filling root-canals which will not fail. If one abutment of an extensive bridge fails, the chances are that the work will have to be completely made over, and I believe that even the best workmen must have a certain percentage of failures in their root-canal work. So the crux of the whole problem seems to resolve itself into making a substitute which will not require devitalization, and preferably that sort of an appliance which can be removed for the purpose of cleansing and repair.

Broadly speaking, with the possible exception of small inlay bridges, fixed bridge work should not be made and these inlay bridges should only be made attached at one end; the other end being supported by a resting lug. I have had the opportunity of observing the work of some of the best removable-bridge workers in this country, and I find that where the work is made sufficiently strong to withstand the strain of mastication, a good deal of devitalization is necessary. Where an attempt is made to carry the work on attachments made in inlays without devitalization, the strength of the piece is sacrificed and the piece is constantly breaking.

A great many of our failures can be traced to a lack of systematic study of

cases. It has been a common practice for students as well as practitioners to undertake a piece of work without having taken X-rays of the teeth or made study models. Study models are almost always neglected. It is of the utmost importance to have good study models, properly mounted on articulators, before deciding upon the procedure in any given case. When this is not done the dentist often has to change his mode of procedure after partly completing the case, and this often causes the patient to lose confidence in him.

The next great cause of failure is lack of judgment in the type of work used. I have in mind now a number of beautifully constructed bridges in which the dentists were supplying posterior teeth on saddles, which necessitated the devitalization of bicuspsids on either side of the mouth. Of course after a time the work began to settle, drawing the supporting abutments out of place. Later a lingual bar denture had to be constructed. If this had been done in the first instance, much better results would have been obtained.

This opens the question of the form of attachments we should use for our dentures. After experimenting with a number of different kinds of attachments and clasps, I have eliminated them all except three; the flat plate clasp, the half-round wire clasp and the cast clasp. The last named has a very limited field. It should only be used on the small Bonwill type of bridges. In many instances, even in this type of work, the half-round wire clasp could be made in less time, give just as satisfactory results, and would probably be stronger and better conformed to the principles of clasp construction that have been laid down by Dr. Bonwill. He made it clearly understood thirty years ago that the clasp should cover the greatest diameter or bulge of the tooth, should have a resting lug on the occlusal surface at a point which corresponds to the contact point the natural tooth would have. This is done to prevent the appliance from being forced toward the gum, and also to prevent portions of food from packing be-

tween the clasps and the teeth which would ultimately force the gum back at this point, forming a pocket and causing subsequent loss of this tooth. Half-round wire clasps are used where the teeth are very short and the greatest diameter is close to the gum. If the appliance settles, this type of clasp more readily allows for adjustment. It is also used in the anterior part of the mouth where it is desirable to show as little gold as possible.

There have been many arguments pro and con in the use of the clasp. The objection has been raised that they wear off the enamel by actual abrasion. I do not believe this to be the case. On the other hand, I have seen numerous instances where the clasp has been worn through by the friction of the teeth themselves with no appreciable wear to the enamel. I have found if there is any wear it is not the abrasive action of the clasps (for if you stop to think, we know that the clasp is of a softer material than the enamel itself), but is due to the collection of a film of partly disintegrated food which is left on the inside of the clasp and eventually dissolves the substance of the enamel which renders the tooth softer than the clasp and then the enamel is rubbed away by the movement of the clasp. If the patient gives the clasp the necessary care, this objection can be entirely overcome, and I can say that in the approximately four years that I have been keeping a record of the cases where the enamel has disintegrated under the action of the clasps, I find that I have only two such cases. In both instances the patients' care of their plates was far from satisfactory. I think it is a good thing to have the clasp absolutely polished on the inside and the patient should be instructed to polish the clasps once a day with an orange-stick and bicarbonate of soda. It takes only a moment to do this work, and the clasps will wear well and give good results. I have seen a number of good teeth covered with crowns, the dentist explaining to the patient that they would prevent the teeth from wearing out. If he had stopped and thought



that to properly make a crown for a tooth it would necessitate so much cutting as to need devitalization, he would have placed the clasp directly on the tooth. If decay occurred after a number of years he would have recourse to a filling and finally to a porcelain jacket crown. At any rate the life of the pulp would have been conserved.

In no case should an extension bar be placed back of the tooth, as it will act as a lever and the tooth will be dragged out of position, resulting in its loss. We should carefully study the position of the teeth we are clasping and select teeth which are parallel with each other. If we do not do so, constant putting in and taking out of the plate will very soon loosen the teeth. We should look to the occlusion and so place the teeth on the plate as to prevent rocking, not depending on the clasp to do this, for if we do, the teeth they are attached to will ultimately be loosened and lost. The general principle of the clasp should only be used to prevent the plate from moving when excessive motion of the mouth is made in mastication and speech.

I have neglected to mention one form of clasp which I have used very successfully in the type of cases where the teeth are lost on one side of the mouth, but on the opposite side are perfect, with no fillings or crowns. In these cases I have used the "Jackson Crib." It was primarily designed for use as a regulating appliance, but works admirably in the cases just referred to where we do not care to devitalize or cut the teeth.

4. INTERPRETATION OF DENTAL RADIOGRAPHS. (Dr. R. OTTOLENGUI, New York.)

5. SPECIAL METHODS IN PLATE PROSTHESIS.

(a.) Principles of Tooth Selection for Prosthetic Restorations. (P. C. LOWERY, Detroit, Mich.)

(b.) Motion-picture Film. (CHARLES LANE, Detroit, Mich.)

The next item on the program was the report of the Scientific Research Com-

mittee, by Dr. A. H. MERRITT, New York City, Chairman, which follows:

#### REPORT OF THE COMMITTEE ON SCIENTIFIC RESEARCH.

Few people are fitted by training, temperament, or experience for scientific research. This explains why it is that a considerable amount of what has been termed "pseudo-science" finds its way into the literature of every profession. Whether or not this has been more true of the literature of dentistry than that of other professions it is impossible to say, but certain it is that it has played its part and has been an actual handicap to professional progress. Mention need not be made of the numberless theories that have been advanced to account for and prevent the phenomenon known as dental caries. In many instances a vast amount of time, expense, and effort have been wasted in following these unscientific theories, only to find that they had no foundation in truth. The same may be said regarding the lesions which affect the investing tissues of the teeth. Reports of certain and permanent cures for pyorrhea, so-called, have filled the pages of our current literature, deceiving many by their specious theories, and thereby retarding the wheels of progress. These things have occurred because men, unfitted for research work, have attempted it, and reported findings which time has shown to have been false.

Scientific research should be a positive contribution to the sum total of human knowledge on the subject under investigation. Unfortunately, the research worker often finds it necessary to expend time and energy in clearing away the false theories which cumber his field. The present Scientific Research Committee is of the opinion that unless the work which it represents can be done in such a way as to actually contribute to the scientific knowledge of the profession, it would be far better to make no report at all. In harmony with this belief, and with the approval of our president, the committee applied to Columbia

University, with the result that Dr. Wm. J. Gies undertook a study of the organism, or group of organisms, responsible for the initiation of dental caries, than which no subject can be of more interest to the profession or of more importance to the public. These investigations have continued up to the present time, the report of which follows and constitutes the report of your committee.

June 11, 1919.

Dr. ARTHUR H. MERRITT, Chairman of the Research Committee of the Dental Society of the State of New York.

Dear Dr. Merritt,—I submit herewith a brief general statement of the scope and findings of the research we have had the pleasure of conducting, during the past year, under the auspices of your committee in behalf of the Dental Society of the State of New York. A detailed statement of our findings will soon be submitted to you. It will be published in the September issue of the *Journal of Dental Research*, if your committee approves both the statement and the choice of the journal proposed for the publication of the data.

Dental caries, in its initial phases, is a direct result of the action of acid produced by bacteria that grow, more or less continuously, at the site of the decay. The acid thus continuously produced at given points on teeth converts insoluble, fixed, basic, calcium phosphate in the enamel into soluble, removable, acidic, calcium phosphate. Dissolution and removal of enamel occur at the site of such bacterial action until the dentin is exposed, when the process becomes one not only of simple solution, but also of putrefaction, involving the additional destructive chemical action of ferments from bacteria.

In our studies of the varieties of bacteria that occur most abundantly at the sites of decay in its earliest recognizable phases, we have found that two acid-producing, enamel-dissolving types are most conspicuous, namely, streptococci and *B. acidophilus*, with the former predominant over the latter. Our studies have also shown, however, that the farther the process of decay advances into the enamel toward the dentin (and into the latter), the greater is the tendency for a reversal of this relationship, so that the initial predominance of streptococci is followed by cumulative relative ascendancy of *B. acidophilus*.

This condition of affairs led us to believe,

originally, that streptococci are not important factors in the causation of dental caries, but are conspicuously present in enamel cavities incidentally, or casually, as a result primarily of their abundance in the normal oral cavity.

Our later findings, however, led us to conclude that the initial predominance of streptococci in enamel caries may be more significant in the causation of dental decay than we supposed, for it is evident, from the properties of these two groups of bacteria, that each type of organism is theoretically capable of initiating the process; but the matter remained open for more direct study. We proceeded with our work under your auspices, from this point of departure.

We sought to go to the heart of our problem on the bacterial origin of dental caries by endeavoring to answer this question: If streptococci, normally present in the mouth, initiate the process of dental decay, do they produce substances that facilitate the later growth of *B. acidophilus*; or do the representatives of the latter type, present in small proportions to begin with, produce substances which favor reduction in the proportion of streptococci? An answer to this question, either way, would obviously afford an important advance in our knowledge of the factors involved in the causation of dental decay.

In attempting to find the truth in this relation we have learned the following primary facts:

(1) Lactic acid, which is produced abundantly by *B. acidophilus*, is very unfavorable (in proportions which do not materially affect *B. acidophilus*) to the growth of the leading representative of the streptococci in initial dental decay, namely, *S. viridans* (the only representative we have studied thus far).

(2) Lactic acid, mixed with powdered enamel, powdered dentin, powdered bone, or powdered tricalcium phosphate, produces soluble calcium lactate and soluble calcium phosphate, although some of the acid and some of the solid remain unaffected in each such mixture. In mixtures containing, originally, proportions of lactic acid, such as those indicated above (1) in which *B. acidophilus* thrives, and to which powdered enamel, powdered dentin, powdered bone, or powdered tricalcium phosphate was added, there was very marked interference with the growth of *S. viridans*, but relatively little retarding action on *B. acidophilus*.

These two general findings show clearly that not only is the lactic acid produced by *B. acidophilus* inimical to the growth of *S. viridans* in dental decay, but also some of



the products of reaction between the lactic acid and dental enamel are particularly unfavorable to the growth of *S. viridans* in initial caries.

We are now justified, we believe, in concluding that conditions that facilitate the lodgment and growth of bacteria on any particular enamel surface, repeatedly or continuously, favor the action there of all the acid-producing types of oral bacteria. Of these bacteria, streptococci are, usually if not always, the most numerous at the beginning of the process, because of their normal abundance in the oral cavity. But as these different kinds of bacteria continue to grow at the given point of focalization on a tooth, *B. acidophilus* produces substances that favor its own growth, but interfere with the development and action of *S. viridans*, a fact that explains the shift in the proportions in these two types of organisms, as caries progresses, which has heretofore puzzled and misled all who have studied this problem.

Our results indicate, further, that lactic acid would not be a suitable ingredient of a dentifrice, because it might favor the growth of the most destructive organisms involved in dental decay. Our findings suggest, also, that sour milk, with its relatively high content of lactic acid, to say nothing of its lactic acid-producing organisms, may be far more detrimental to the teeth than has hitherto been supposed.

These results indicate that important advances might be made in our knowledge of the cause, and in our means for the control of dental caries, if we could learn the nature of the acid or acids produced by *S. viridans* and other oral streptococci, and if we could determine the effects of these acids and their dental products in studies similar to the one we summarize in this report.

I recommend that such studies be conducted, by others or by us, under your auspices.

The experiments that were conducted in execution of our plans, and on which these conclusions are based, were very ably and effectively carried out by my former collaborators in bacterio-chemical studies of dental caries and in biochemical studies of saliva, Mr. S. D. Kramer and Dr. G. A. Lowenstein.

With my personal compliments to the members of your committee and of the society, I remain,

Yours fraternally,

WILLIAM J. GIES,

*Biochemical Laboratory of Columbia University, College of Physicians and Surgeons, New York City.*

## DISCUSSION.

Dr. Montgomery La Roche, New York City. I consider it a great honor to have been selected to discuss this important paper before you. To my mind there is no more important subject in dentistry today than its bacteriology.

There is no denying the fact that in dealing with the bacteriology of the mouth we have a tremendously difficult subject before us, and we are indeed fortunate to have had as our guiding spirit in this research a man of such high standards and intelligence as Dr. Gies. Research in medicine has always greatly appealed to me, and although I am the merest tyro at it, I have gotten a lot of keen enjoyment out of it. I have not accomplished anything very startling, but then one always has hopes. There are, however, a number of things that have occurred to me in my attempted journeys into the unknown, and I hope I may be permitted to call some of them to your attention. It is interesting to note that Dr. Gies and his collaborators have come to the somewhat firm conclusion that the streptococcus is the initial cause of tooth decay, and that they are unable to continue it by reason of the by-products of their labors. As long ago as 1675 the study of the bacteria of the human mouth was begun by Leuwenhoek, but the first really important work done in that line was Miller's in the 80's. Since then some, but not very many, investigators have turned their hands to the subject with indifferent results, until today we are fortunate to witness the completion of the most important and exhaustive work that has been recorded along these lines.

Miller did much and his work stands today as a milestone, and a mighty important one, on the road to progress, but his identification of those bacteria was far from correct. I would, however, strongly recommend the study of his work "The Microorganisms of the Human Mouth," to any who are greatly interested in this subject. We should all try to get acquainted with these bacteria. When you stop to think that in almost any department of dentistry we

are dealing with bacteria, it may occur to you, as it does to me, that it is one of the departments of our science with which we really are not very well acquainted. For instance, how many dental offices have a microscope? How many dentists know how to take cultures, to say nothing of staining and examining them? Did you ever see a commercial dental exhibit display a microscope or other bacteriological paraphernalia? Opportunity is continually given to become acquainted with the technic of bacteriology, and unless we do so and in that way are enabled to study our friendly enemies, how are we to apply our knowledge of warfare to the best advantage? The necessary equipment is neither expensive nor bulky, particularly when compared with some of the wonderful apparatus that is put on the market by the dental supply houses. But to continue, now that we have come to the conclusion that streptococci initiate decay, what are the deductions that naturally force themselves upon us? What are we going to do about it? Dental research is in its infancy and medical research has but scratched the surface, and together we must continue our investigations. It will be one of the greatest factors in cementing the entente that has arisen between the dental and medical professions into a lasting unity for the betterment of humanity.

To my mind one of the important features of the report is that streptococci are found in all mouths, healthy and otherwise. Why do they act in some and not in others? What are the factors of immunity? Of disease? We have all, no doubt, seen instances of arrested decay. Miller speaks of it, too, but was unable to solve the problem. He did not have time to seriously try. We all know that diet has a tremendous effect on both the local and general conditions of the body; that the lower animals do not suffer from dental disease as does man. It is known that the saliva of lower animals is markedly alkaline, while that of man slightly so or neutral. Why do some humans suffer from caries more than others? Clean teeth are not always

the reason for escape, tremendously important though they are. We cannot live like animals, that is, out-of-door life, diet and exercise. And I do not believe that that would destroy our susceptibility if we did. It occurs to me that we should try vaccines and serums. Practically nothing has been done, so far as I know, in this line for the prevention of caries, and I believe it should be given a thorough try out. Do people suffer from caries because the whole system is infected or has become susceptible to streptococci, or is the susceptibility and infection confined to the teeth?

Saliva as a germicide is out of the question, but I do believe it may contain factors of immunity. Mayo says, speaking in regard to general systemic infection: "The cure of any disease or infection depends on the reaction of the body in fluids and cells to the irritation which develops so-called antibodies or chemical solutions as germicides or cells as destroying agents of bacteria with an increase of repair cells." He also further states, "Our system may at times become allergic to bacteria of certain types, as each type requires a biochemic factor in order to obtain a foothold." In view of the fact that there is such a thing as immunity to dental caries, it does not seem beyond the range of possibility that such a condition could be artificially brought about.

**Dr. Bertram B. Machat**, New York City. Dentistry, like medicine, is undergoing a process of intensive evolution. In the light of new evidence well-established practices are being closely analyzed and consistently abandoned. The principle of extension for prevention is in vogue. It has, however, taken on a much greater meaning. Our slogan is rapidly becoming that of elimination for restoration—the eradication of dental disease for the restoration of health; and, as a logical sequence, the application of the truly great principle of prevention.

In the consideration of preventive dentistry, our first task is the determination of the different agencies that initiate dental caries. In this regard many theories have been advanced by various



investigators, and judging from the reports of the ever-widening scope of research as inaugurated by Dr. Gies, it becomes manifest that the latter is preparing a solid foundation for the up-building of the great truth which is underlying this stupendous question. In so doing every theory hitherto adduced will undoubtedly receive careful, unbiased, scientific consideration. The acid theory; the influence of environment, diet, heredity, immunity, diffusion; the phenomena of the internal secretions, the presence and product of micro-organisms, etc.—these already have to a greater or less extent been dealt with.

By far most workers adhere to the chemo-parasitic doctrine as the undoubted etiology of dental caries. To this today's report of Gies and his collaborators gives added weight. As in all of his previous works in connection with the solution of this complex problem, Dr. Gies after exhaustive investigation reduces also the microbic phase to a simpler equation. Of the vast number and types of bacteria in the mouth flora, he points to the most common offender; i.e., the *Streptococcus viridans* and to the otherwise non-pathogenic type, the *Bacillus acidophilus*, as the true factors in the causation of dental caries. To the dentist this should be instructive; for of late we have come to know more of the nature of the streptococcus and we can thus appreciate the far-reaching pathogenicity of this organism in our own field, notably when in symbiosis with another organism, especially a bacillus (we know of the grave prognosis that attends the presence of the streptococcus in combination with the Klebs-Löffler bacillus in diphtheria, the mixed infection in tuberculosis, the grave lesions that arise from the combination of this coccus with colon bacillus in the gastrointestinal tract; the serious significance when in combination with the Pfeiffer bacillus in influenza). And so we see that the not infrequent allusion to the mouth streptococcus as being inert is not a safe deduction. This is important for the reason that ordinarily the viridans is an organism of low virulence, and if

it took seven days, as I heard here yesterday, to grow them their pathogenicity would really be negligible. However, this is not borne out in our experiments. We have a particular acquaintance with this bacterium, and we find that on suitable media, such as calcium broth, it will grow luxuriantly within eighteen to twenty-four hours, often in less time than that. So also in dextrose or glucose broth it will grow in from twenty-four to forty-eight hours; somewhat longer on glucose agar and blood agar. Certainly there are many factors that enter into the inhibition of the growth of bacteria, it is largely a question of technique. So we see that this is all germane to the subject which we are discussing, for just such media as have been used in the laboratory are actually present in the mouth where conditions are even more favorable. The ability of the cocci to break up dextrose and form acid is common observation, so that in immunological work it becomes necessary to transplant them often or else they die off quickly. The same condition occurs in relation to the action of these bacteria upon teeth in the mouth. As has been pointed out in the report, the cocci, chiefly the viridans, initiate the acid reaction bringing about a two-fold change, namely, the solution of enamel and the preparation of a mild acid medium for a rapid proliferation of the acidific bacillus which, as has been noted from the investigations of Gies and his associates, thrives on a fairly high percentage of acid. To a certain degree these changes are dependent upon the action of the saliva as has been argued by several authors. Mild organic acids will stimulate alkaline saliva, and so we may reasonably assume that very frequently the cycle is repeated, that is, under a changed alkaline or neutral environment the cocci again attain ascendancy.

And while this process may go a long way toward the explanation of dental caries, does it sufficiently explain cause and effect as viewed from our experience in every-day practice? What of the filthy mouth without caries; what of the well-kept mouth with numerous carious.

teeth; what of marked caries bilaterally affecting certain groups of teeth while the remaining teeth are immune? Again, what of the incidence of caries in variable degrees under similar conditions of hygiene and diet in given families; and again, what of the comparative freedom from carious teeth of individuals coming from one civilized center as against the ravages of dental decay of peoples less than a thousand miles distant? For many years we have taught that "a clean tooth does not decay." For some time I reasoned that whatever the predisposing causes, a tooth will decay in proportion to the uncleanness thereof. But while that held good in relation to persons past a certain age and under normal conditions, it failed to hold good in youth, pregnancy, and—shall we say—hyperthyroidism, etc.

From the study of the maze of literature upon the endocrins and their casual reference to morbid dentition and dental caries, one is faced with no small task. In this respect our hope lies in the work, that is, in the further work and guidance of Dr. Gies. We are told by different authors that bone metabolism is influenced directly and indirectly by nearly every internal secretory gland, and since a close analogy may be drawn between bone and teeth, may we not by further study establish which of the ductless glands, if one alone, can ultimately be held accountable, and, if so, its practical value from the clinical viewpoint to the dentist. In this regard the splendid work in chromo-therapy by Dr. Gies in his experiments on thyro-parathyroidectomy is certainly illuminating and fully in accord with other investigators. He concludes from these investigations that enamel is not affected by the mobility of lime and other salts in adults, and yet further in the same report, we note, "That whether or not there is true nutritive or maintenance metabolism in normal enamel, there may be physiological or pathological exchange of materials in enamel by diffusion from blood to oral fluids and *vice versa*." The latter thought seems to be borne out by the recent work of Bunting. Dr. Gies'

further deductions upon hyperthyroidism as related to decalcification of teeth are again borne out in our observations upon cases of pregnancy. Here we can correlate the ovarian, adrenal and thyroid factors. Certainly there are many obscure causes that lead to disturbed thyroid both hyper and hypo, and of special interest to the dentist is the fact that many of these patients harbor deep-seated chronic dental infections. It has been the observation of the writer that such patients have been greatly relieved and even cured through eradication of foci of infection in the mouth. It is reasonable to assume that a toxin which is capable of affecting nearly every organ and tissue in the body is also likely to set up morbid conditions in the internal secretory glands; in which case the latter would be a secondary lesion, and the result would after all depend upon the elimination of the diseased teeth. This brings to mind three hyperthyroid cases, women between the ages of twenty-two and forty, in whose mouths caries ran rampant. Ultimately these patients were operated upon for goiter and have made fair recoveries. A striking improvement, however, followed the eradication of chronically diseased teeth at a subsequent time.

In the hope that it may excite discussion I would mention the case of a young giant who at the age of twelve, was five feet and one inch in height, intensely nervous, with a complement of twenty-eight highly transparent though normally shaped teeth in good occlusion. Between the ages of nine and twelve, he developed thirty-eight cavities. It took endless patience and perseverance to keep his teeth from falling apart. At thirteen years of age, however, caries ceased and since then, now two years, a remarkable improvement of the teeth and the individual has been noted. He is now six feet and two inches tall. If heredity has any significance, I would add that both parents have at all times been almost entirely free from caries. Here we have an example of the close interrelation of various glands notably anterior pituitary, thyroid, parathyroid, etc.



From the few foregoing remarks, it appears that, as we delve into the influence of the hormones upon the teeth, we realize more and more the need of the thinking dentist to study the pathological physiology of ductless glands and particularly the phenomena of the thyroid. Until more light is shed upon this very important phase of dental caries, it is our highest professional function to encourage the splendid work already well established, that of prophylaxis both at home and in the chair, with special emphasis upon proper physiologic stimulation of the soft and hard tissues by frequent agitation, and of close attention to caries however superficial.

The old maxim might profitably be encouraged in connection with teeth, namely, an apple or two a day will keep the dentist away.

In closing, we repeat that similar biological laws hold good in the causation of dental caries as in disease elsewhere in the body, that decay of teeth is not the result of a simple process, but the sequence of manifold disturbances both predisposing and exciting; and that much work is yet left to be done before definite conclusions may be drawn.

The President, Dr. Beach, next introduced the Speaker of the Assembly, Mr. Sweet, who spoke of the subject of the Davenport-Donohue Health Insurance Bill.

PRESIDENT BEACH. We are greatly indebted to Mr. Sweet for his explanation of this bill which affects all of us. Your Executive Council have acted upon his suggestion in the appointment of a committee which shall meet other committees from other professions to consider this bill.

I wish here to announce the donation of \$500 by the Dental Society of the State of New York to the fund for aiding French and Belgian dentists. This fund is being raised through the Preparedness League of American Dentists. We had in New York State some time ago a fund raised to purchase an ambulance. This ambulance was never sent; in fact, it has been stored for two years. It was decided to sell the ambulance, and a portion of the money received from the sale has been appropriated by your Council to this worthy purpose of furnishing supplies and money to the Belgian and French dentists who are lacking in the needful things wherewith to follow their profession. Individual contributions are also solicited. Dr. Waugh is the treasurer, and he will be pleased to receive any personal contributions of money, as well as contributions of spare equipment.

Adjourned until the evening session at 8 o'clock.

(To be continued.)

# THE DENTAL COSMOS

A MONTHLY RECORD OF DENTAL SCIENCE.

*Devoted to the Interests of the Profession.*

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EDWARD C. KIRK, D.D.S., Sc.D., LL.D., *Editor.*

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PHILADELPHIA, JANUARY 1920.

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## EDITORIAL DEPARTMENT

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### Our Anniversary Greeting.

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THE present issue of the DENTAL COSMOS signalizes the sixtieth anniversary of its continuous publication, although the actual anniversary date has already passed. As we may properly regard the twelve years of publication of its predecessor, the *Dental News Letter*, as the origin of the enterprise, the developments and professional progress of dentistry for upwards of three-quarters of a century are recorded in the pages of the two publications. The period covered is nearly coincident with the history of dentistry as an organized profession, and throughout that period it has been the aim of the DENTAL COSMOS to record and portray the best achievement of dentistry as an art and as a science. Its selec-



tion of matter has been rigidly governed by that standard; it has studiously avoided the exploitation of faddism, of politics or personalities. Its ideal has been to set forth whatever in the science or art of dentistry would contribute most directly and fully to the increase of efficiency and the high character of the service which it is the function of the dental profession to render in its ministrations to the health of the public.

But the purpose of the DENTAL COSMOS has included more than its function as a repository of the archives of dental professional achievement. Because of its broad relationships and the opportunities which have brought it into contact with dental activities throughout the civilized world, it has developed a position which has afforded it opportunity of a peculiar, not to say unique, character as an observer of the flow of events that is constantly moving toward a larger world importance for dental service. As a consequence of this opportunity for a larger vision, the policy of the DENTAL COSMOS has come to include to a degree the function of guide and counselor, not as prophet or seer, but in some such sense as the lighthouse keeper or signal officer may serve to point the way and warn the traveler of dangers to be avoided.

The DENTAL COSMOS has made no pretensions to infallibility; it is fully conscious of its shortcomings, yet, by reason of its many years of continuous service, its growth from small beginnings to a commanding position in the world's dental journalism, above all, by the practical evidence furnished by its ever-increasing list of subscribers throughout the world and the many unsought expressions of approval that it constantly receives, it has become a self-evident fact that the DENTAL COSMOS has justified its existence, its policy and its service to the profession in whose welfare all of its activities are enlisted.

It is, therefore, with what we believe to be a pardonable pride that we issue this souvenir number in which at the request of the Editors a group of well-known authors, each a specialist in the field of which he writes, presents a retrospective view of those phases of dentistry which have most prominently developed during the life-history of the DENTAL COSMOS and in connection with which it has taken an active part.

The story is but partially told, for as a matter of fact not even the sixty volumes of the DENTAL COSMOS have served to con-

tain the whole record, but the historical retrospect embodied in this souvenir issue will, we feel sure, be interesting reading, especially to those who have joined the dental professional ranks since the discovery of the germ origin of disease and the fundamental revolution in therapeutic technique which it produced came to be accepted practice.

The evidence of sound professional progress based on scientific principles which the symposium of articles in this issue contains must be a source of encouragement and inspiration to all who are demanding of dentistry its highest and best expression. It was Andrew Carnegie, we believe, who on one occasion in a public address said, "If you don't believe we have progressed, just look back and see where we came from." Applying this test to the question of dental progress we see that in 1844 dentistry was an empirical handicraft; its notions of pathology and therapeutics were a reflex of the ignorance of the time; "laudable pus" held sway and in suppurative apical pericementitis the exudate was regarded as a "secretion" of the root and the treatment was a "tap-hole" at the cervico-gingival margin to afford an exit for it. Antisepsis was unknown. Inflammation of the periapical tissues in pulpless teeth filled with amalgam over empty root-canals was charged to mercurial poisoning and much more of like character. Compare this with the present status of dentistry and the rate and degree of advancement becomes obvious.

We are fully abreast with the most recent developments in biologic science as applied to the vital problems that confront us as practitioners, and our therapeutic technique is founded more and more surely upon the rationalism, which is the outgrowth of scientific research.

Moreover, we are launched upon a new era of prophylaxis in its larger sense, the prevention of dental and oral disease by the inculcation of proper knowledge among the developing citizenry of our nation with respect to oral hygiene, correct food habits and general care of the bodily health. The part which the dental profession is called upon to play in this all-important crusade is a leading, not to say a commanding one. Moreover, it involves a responsibility that cannot be shirked or avoided. Recognition of the saving grace of oral hygiene is spreading throughout the world at flood-tide proportions, and to meet the demand for its prac-



tical accessibility by the majority of the population will mean fundamental reorganization of our professional attitude of mind toward many of our elemental problems of education, legislation, practical technique, and even some items of our ethical standards so-called, that will be as revolutionary as some of the changes of attitude in past times toward the then respected and, for the time being, "standardized" professional ideals.

The DENTAL COSMOS looks forward with confidence to this new era of professional development, a confidence begotten of the virility and wholesomeness of the spirit of the dental profession in solving its problems in the past. What it has already done in the past it can be trusted to do in solving on rational lines the larger problems which confront it in the future. In the spirit of professional co-operation which has always animated its service and with confidence in the soundness of its cause, and with hopefulness for the future, the DENTAL COSMOS greets its army of readers on its sixtieth anniversary with a feeling of profound satisfaction and happiness as it contemplates the achievement of the purpose toward which it has continually devoted its resources and best endeavor in common with the profession which it is its function to serve.

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**Dr. William W. Belcher.**

WE regret to announce the death of Dr. WILLIAM W. BELCHER, Editor of *Oral Hygiene*, Rochester, N. Y., on December 4, 1919. An obituary notice of Dr. Belcher will appear in a later issue of the DENTAL COSMOS.

# REVIEW OF CURRENT DENTAL LITERATURE

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[*Lancet*, London, July 5, 1919.]

## Case of Multiple Osteomata of the Skull Bones. BY C. N. SLANEY.

The patient was a man of forty, mentally approximating to the cerebration of a child barely one-fourth of his own age. In 1888, at the age of about twelve, he received a blow on the right mandible. Three months later he noticed a painless swelling, gradually increasing in size. Removed by operation. No evidence of fracture; right ramus much thickened. In 1890 a similar small tumor appeared over left maxilla, attributed to a blow by a stone. In 1893, appeared a painless swelling in left mandible; no history of trauma. In 1895 a fourth tumor gradually developed; no history of trauma. Two other tumors developed above the maxillary region. The bony outgrowths on the mandible are bilateral.

[*Surgery, Gynecology, and Obstetrics*,  
Chicago, October 1919.]

## Scar-tissue Tumors Occurring on the Mucous Membrane of the Lower Lip. BY JOSEPH COLT BLOODGOOD.

The condition to which Bloodgood, particularly at this time, directs attention is an infrequent type which usually is diagnosed clinically and often pathologically as *recurrent carcinoma*, both by surgeon and pathologist. In reality the lesion is a benign scar-tissue tumor, a "keloid," and the best results are obtained when it is left alone. The author's observations also emphasize the vital importance to the patient that these little, apparently innocent primary tumors should not only be studied microscopically, but the original sections and tissues should be preserved, because if the scar-tissue tumor does develop, the knowledge that the primary growth was benign allows one to be certain that the induration in the scar is not due to the local recurrence of a malignant tumor.

Primary carcinoma of the mucosa of the lower lip is rare. The position of onset of carcinoma of the lower lip is usually at the *mucocutaneous* border. When this local lesion is excised as a V-shaped piece of tissue and the wound closed, Bloodgood in an experience of over twenty-five years has never observed the keloid or scar-tissue tumor to which reference is made in this paper. If an induration appears in such a scar, the probabilities are that it is a recurrence. But local recurrence after the proper complete excision of a primary carcinoma of the lower lip is unusual. However, when a piece of the mucosa with the submucous glands is excised for a benign tumor of the mucosa or a benign cyst of the submucous glands, a little keloid growth is not an infrequent sequel. Associated with the induration in the scar there is always the sensation of tension and discomfort and the swelling of the lip in and about the scar varies. This change in the size of the palpable area is characteristic. These scar-tissue tumors on the mucosa of the lower lip have apparently no relation to the nature of the primary lesion, whether it be in the mucosa or submucosa. Apparently they are more apt to occur in the first instance when the primary lesion had been treated by caustics or when the wound has healed by granulation.

Six cases have been reported in detail to present the problem clearly and to settle the method of treatment—noninterference.

[*Proc. Royal Society of Medicine—Section of Laryngology*, July 1919.]

## So-called Malignant Mixed-Parotid Tumor. BY W. S. SYNE.

The patient, a woman of fifty, complained of sore-throat for about three years, with slowly increasing swelling on the left side. Examination showed a bulging of the left side of the soft palate well toward the mid-



line. No ulceration. Apparently the tonsil was not invaded. On palpation, the swelling appeared firm in places, and almost fluctuant in others. Under chloroform, an encapsulated growth about the size of a hen's egg was removed. Histologically diagnosed as malignant, a mixed chondro-endothelioma. No recurrence.

[Published by Albert de Lange, Amsterdam, March 31, 1919.]

**Experimental Investigations upon the Acidity of the Saliva of Pregnant Women and Its Reputed Influence on Increasing the Frequency of Dental Caries.** BY E. J. VAN DEN BERG.

The author has studied this problem from a number of different viewpoints. He investigated the mouths of 150 women, who never had been pregnant, and found that in regard to dental caries the conditions in this group were no more favorable than the conditions observed in another group, consisting of pregnant women.

Incidentally to the main line of his studies, there was found in 123 pregnant clinic patients a percentage of 80 (98 individuals) with gingival disease. As a control the mouths of 50 women, not pregnant, were examined; twenty-seven, *i.e.*, 54 per cent., showed gingivitis. Van den Berg concludes that the etiologic factor in the so-called *gingivitis gravidarum* is to be found in the calculus formation and that pregnancy is a predisposing factor for this deposition. The mechanism of this predisposition is explained very simply as follows: On account of the general indisposition experienced by many women during pregnancy, there is a diminished exercise of the masticatory function, with resulting accumulation of calculus, and the consequent hyperemia and gingivitis. In brief, the predisposing factor for gingivitis of pregnancy is the lessening of the natural active massage of the gums.

It is interesting to note that van den Berg agrees, however, without presenting any original data, with the view that metabolic processes may occur in the enamel during the life of the individual and of the tooth after eruption.

An obvious misunderstanding of Miller's views on the etiology of dental caries is inexplicable. According to van den Berg, Miller

did not specifically offer any explanation as to the origin of the acid, acting as the de-calcifying agent in dental caries; and, in fact, did not in general ascribe it to bacterial mediation. This interpretation of Miller's views is of course absolutely untrue.

The only significant source of oral acidity which van den Berg seriously considers is the hydrochloric acid brought up into the mouth during the vomiting of pregnancy. To neutralize this, he suggests Phillips' milk of magnesia, one part to one part of water, used as a mouthwash *immediately* after each attack of vomiting.

The author determined the acidity of the saliva by titration with NaOH, N/200. As a result he concludes that the acidity of the saliva is no indicator for the frequency of dental caries. No parallelism can be established.

The next series of experiments was a determination of the salivary reaction by the H-ion concentration method (*vide* Kirk, Crowell, and Appleton, *Journ. Allied Dent. Soc.*, 1914, p. 186). A number of pregnant women supplied the material. This method confirmed the result of the titration method. No connection could be found to exist between the H-ion concentration of the saliva and the extent of dental caries.

Van den Berg brings this paper to a close with a review of Marshall's work (*vide* DENTAL COSMOS, January 1917, p. 33).

The latter's views were subjected to experimental tests. The salivas of a number of pregnant women were used. It was found that at least in the case of pregnant women, there is no parallelism between the frequency of dental caries and the magnitude of Marshall's salivary factor.

In summary it may be said that van den Berg rejects the widely held and popular view that pregnancy predisposes to dental caries. The evidence upon which this conclusion is based is furnished by—

1. Simple inspection and comparison of the extent of dental caries in pregnant women and in women who never had been pregnant.

2. Determination of the degree of salivary acidity by titration with NaOH (indicator not mentioned) and comparison of the degree with the extent of caries.

3. Determination of the degree of salivary acidity by the hydrogen-ion concentration

method and comparison with the extent of dental caries: and

4. Determination of Marshall's salivary factor and comparison of the value of this factor with the extent of dental caries.

The method, to which No. 1 above refers, is very pertinent to the question and its result affords weighty support to van den Berg's thesis. However, the methods, Nos. 2, 3, and 4, bear only indirectly upon the question and prove nothing more than that salivary acidity (reaction) does not run parallel with the extent of dental caries. This last conclusion is of course very important, but is not applicable to the problem of the potency of pregnancy as a predisposing factor for dental caries.

[*Journal of the American Medical Association*, October 25, 1919.]

**The Ectoenzymes of Streptococci.** By M. S. TONGS.

In the present almost chaotic state of our classification of the streptococci, any light which may be thrown upon the biological activities of this important group is welcome and tentatively important. The results of Tongs' experiments show that among the hemolytic streptococci there seem to be three groups: one digesting casein, one starch, and the other neither starch nor casein. Among the green-producing streptococci (the groups of *S. viridans* and *S. salivarius*) only two groups appear; one digesting casein and the other without action on starch or casein.

[*Proceedings of the Royal Society*, Section of Odontology, London, June 1919.]

**Variations in Position of the Teeth in New World Monkeys.** By J. F. COLYER.

This is a descriptive and statistical study, bearing upon comparative odontology, comparative dental pathology, and orthodontia. It is a partial report (including only the monkeys of the New World, the families of the Cebidæ, and of the Hapalidæ) of a systematic examination of monkeys in the British Museum, in the Royal College of Surgeons, and in a private collection. The present report is based upon 629 adult specimens, while the entire study is based upon over 1500 specimens. The second report, presumably upon the variations in the position of the teeth in Old World monkeys, will be of more direct interest because of the closer

relationship of the Old World primates to man. Apart from the many details, two points of general interest stand out—(1) The degree of variation in the Cebidæ is markedly greater than that in the Hapalidæ. (2) The degree of variation is quite different in the several genera of the Cebidæ.

These two phenomena mark the Cebidæ as a family subject just at present to active evolutionary change, at least in so far as the form of its dental arch is concerned, while the Hapalidæ are relatively stationary. The orthodontist, who is searching for a valid conception of the *normal*, will in these data find much food for thought, but certainly not the solution to his problem.

[*Lancet*, London, August 2, 1919.]

**Flavin in the Treatment of Comminuted Fractures of the Jaws and Acute Septic Stomatitis.** By H. WATSON TURNER.

In the treatment of jaw fractures, after anesthetization, all bony fragments were left undisturbed. The whole fractured area was bathed and soaked for five to ten minutes with 1:1000 flavin solution, disturbing the parts as little as possible. The external wound was cleansed with flavin solution and dressed with gauze soaked in flavin, which was also used to pack lightly any sinuses. Cleanliness of the mouth was insured by frequent syringing.

In the treatment of acute septic stomatitis, it is essential to get rid of the acute inflammation before instituting operative measures. The following treatment has yielded excellent and rapid results. Syringe out the mouth with flavin, 1:1000, special attention being paid to all pockets. Gauze soaked with flavin solution is lightly packed into the angle of the cheek and all around the gums—retained in the mouth twenty to thirty minutes. Repeated three times daily.

[*Surgery, Gynecology, and Obstetrics*, Chicago, October 1919, vol. xxix, pp. 334-339.]

**Cutting the Sensory Root of the Gasserian Ganglion for Relief of Trifacial Neuralgia.** By A. W. ADSON.

Division of the sensory root or physiological gasserectomy appears to be the operation of choice in the radical treatment of trifacial neuralgia. Attention was called to this treatment by Spiller in 1898 and by Frazier in



1901. (University of Pennsylvania Medical *Bulletin*, Philadelphia, vol. 14, pp. 342-352.) Following this, Van Gehuchten presented his investigation, which corroborated their work. (Névraxe, 1903-4, V, 199-226, translated in University of Penna. *Medical Bulletin*, 1904-05, vol. 17, pp. 50-59.) In 1918, Frazier (*vd. abstract in DENTAL COSMOS*, September 1918, p. 829) reported his experiences with 302 cases.

In operating in 10 cases of trifacial neuralgia in 1917, and in 28 cases in 1918, at the Mayo clinic, two complications have attended the technique suggested by Frazier and Spiller: the occasional paralysis of the seventh nerve and the trophic interstitial keratitis. When seventh nerve palsy occurs, it is accompanied by a lagophthalmus which, in turn, permits undue exposure and dryness of the cornea, resulting in abrasions and the formation of trophic ulcers. Interstitial keratitis may occur independently of paralysis of the seventh nerve; it is very troublesome and may result in the formation of an opaque cornea. If these complications could be avoided in the technique, the operation could be recommended without any hesitancy to patients suffering from trifacial neuralgia.

Adson had four patients with a seventh nerve paralysis. He is unable to say definitely what are the causal factors were, but on avulsing the ganglion roots at postmortem considerable trauma in the pons at the point of exit of the posterior root of the Gasserian ganglion was noted. It seems probable that the cause of occasional seventh nerve paralysis is trauma resulting in small hemorrhages and edema of the pons, and of the brain stem. This view is further verified by the results obtained when the posterior root is cut and not avulsed. No seventh nerve paralysis occurred in 26 consecutive cases from January to August 1919 since this change was made in the technique.

In the author's observations, it was found that whenever trophic interstitial keratitis occurred, one of two things happened at the time of operation; either the dura propria had been split so that the ganglion was greatly exposed or it was necessary to insert a large pack to control bleeding, thus causing pressure on the ganglion. It was also noted that if only the posterior margin and root were exposed, there was never any immediate

keratitis. Adson believes, from experiments on dogs and clinical observations on man, that sympathetic fibers play an important part in the trophic supply of the cornea, or that its function is controlled by the ganglion cells of the ophthalmic division, which, if not injured during the operation, will protect the cornea against ordinary irritations. The ganglion cells or sympathetic fibers remain uninjured if the dura is not elevated over the ganglion.

The details of the operation are briefly given. The principles of physiologic gasserec-tomy laid down by Spiller and Frazier were carried out, except that the posterior root has been exposed without injury to the ganglion and particularly the cells supplying the ophthalmic branch, thus decreasing the frequency of trophic interstitial keratitis, and the posterior root is cut instead of avulsed, thereby avoiding the occasional seventh nerve paralysis.

[*Journal of the American Medical Association*,  
September 27, 1919.]

**Macrocheilia.** By FREDERICK B. MOOREHEAD  
AND KATHIE W. DEWEY.

Macrocheilia, or enlargement of the lip, is essentially an hypertrophy or hyperplasia involving chiefly the lymph vessels. However, the bloodvessels may be as much involved as the lymph vessels, and occasionally the bloodvessels alone are abnormally developed. An entirely different and rare type of macrocheilia is represented by a few cases in which the enlargement was due to an abnormal development of the mucous glands of the lips. The condition is usually congenital. Instances in which it developed late in life are rare (one case at forty-seven years and another case at fifty-four years). The development is rarely acute; generally it is slow, and interrupted by long intervals.

Radium has been applied, utilizing the gamma-rays alone, with success. Ten days after the first treatment the tumor had completely disappeared. Moorehead personally is noncommittal on radium in this regard. The surgical operation is not difficult, but great care must be taken to avoid deformity. The lips are clamped with a lip-clamp to prevent hemorrhage which is profuse. The mucosa is opened by two parallel incisions the entire length of the lip, and a small section

of tissue is removed. By careful dissection, the excessive lymph tissue is removed until the lip is reduced to normal. The wound is closed with a figure-eight horsehair suture, the first loop closing the deep structures and obliterating dead spaces, and the second loop closing the mucosa. If horsehair is used in this fashion, buried sutures are not necessary, and the scar formation is reduced to a minimum.

[*Surgery, Gynecology, and Obstetrics*, Chicago, October 1919, vol. xxix, pp. 325-332.]

**Intentional Removal of Skin and Other Tissues Overlying Deep-seated Inoperable Cancer: A Necessity for Effective Treatment with X-ray or Radium.** BY EMIL G. BECK.

The second case reported in this contribution involved a carcinoma of the jaw in a man, aged sixty. The growth first appeared on the lower left lip, was removed and healing occurred. In less than two years, return was noticed, shortly followed by enlargement of the lymphatics of the same side (left). A radical operation was performed with resection of the submaxillary gland and all the lymphatics on that side, as well as resection of the tumor in the mouth and part of the lip. A plastic operation was done at the time of closure. In less than a year, recurrence took place in the mandible. This time

the lower part of the transverse ramus of the mandible and all the overlying tissue were removed, and the ascending ramus curetted. The wound was not closed. Radium and X-ray were applied directly into the diseased tissue. Healing took place rapidly.

For nine or ten months, the patient remained perfectly well, when he developed severe headache and earache. It was uncertain as to whether there was any recurrence high up under the cranium, but very likely there was. There was no recurrence, however, in the neck or at the seat of the operation, which was treated by the exposed method. The patient is still under observation. End-result is uncertain.

[*British Dental Journal*, London, August 15, 1919.]

**The Importance of Nasal Breathing in Prevention of Dental Caries.** BY C. N. PEACOCK.

The importance depends upon two theses, both of which Peacock accepts as valid: that (1) there is a more continuous flow of saliva over the teeth in nasal breathing than in mouth breathing; and that (2) in addition to the mechanical action of washing away food debris and of neutralizing acidity, the saliva is continually endeavoring to saturate the enamel with lime salts.

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## PERISCOPE

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**A Rural Motor School Clinic in England.**—The plan is that the dentist working under the supervision of the county medical officer travels through the country in a large motor with a dental chair and accessories and examine and card-index the school children. He sends the head teacher notice of his visit, when he inspects only, makes out his list, and returns in three weeks for treatment. Free advice is given to the parents concerning the state of the teeth, and a fee of twelve cents is made for each child, for free treatment often causes the benefit to be underestimated. Parents are seen without appointment on fair days. The dentist sells

toothbrushes at four cents each, and gives an occasional illustrated lecture. During 1918 seventy-two schools were visited and 1398 children treated.—*New York Medical Journal*.

**Treatment of Acute Septic Gingivitis (Vincent's Disease).**—As one sees nowadays so many cases of this disease, I should like to suggest a simple treatment which I have found most effective. After the usual routine treatment of antiseptic mouthwash, iodine, scaling, and removal of septic roots, I instruct the patient to have the gums syringed two or three times a day with potassium permanganate solution (1:5000): "the color



of pink blotting paper" is quite enough guide as to the strength of the solution. A 4-oz. glass or an ear syringe with a fine nozzle may be used, the essential part of the syringing being to use a good deal of force. Have the syringe about one foot away from the patient's mouth, and freely syringe all affected parts; this washes away the pus, sloughs, and grayish membrane from the gums and between the teeth. The patient will always find someone at home to do this syringing for him. This treatment makes a wonderful improvement even in two or three days; the painful condition of the gums ceases, foul odor of the breath disappears, and the gums take on a healthy appearance. The reasons for this rapid improvement are:

(1) The organisms which cause this condition, fusiform bacilli and spirochætes, are easily washed out if enough force is used in syringing.

(2) Those organisms that are left are killed by the oxygen from the potassium permanganate frequently used, as these germs are anaerobic, and also will not flourish in the absence of necrosed tissue.

(3) The force of the syringing acts as a gum stimulant, and the blood supply is increased.

I have practiced the above treatment now for the last four years with good results, in England and abroad. One finds more cases of this kind in the tropics than in England, but lately they seem to be increasing here.—ALBERT B. COCKER, *British Dental Journal*.

**Short Cut in Goslee's Method of Making Gold-Base Bandless Crown.**—Prepare the root and insert post as for an ordinary detachable porcelain crown, such as the Davis crown. No care need be taken regarding the alignment of the post. It is only necessary to put the post in the most favorable position for strength and retention as regards the individual root.

Take an impression of the root with post *in situ* in dentallac or modeling compound. The best way is to shape the composition like a pencil about half an inch long. Have it nearly hard, then soften the point in the flame, and apply to the root with considerable pressure. Chill well and remove. The impression with post in position is now cast in good, hard-setting plaster of Paris to which has been added, in mixing, a pinch of potassium sulfate. The model thus obtained is trimmed to the root outline, and 32-gage 24-k. gold gently swaged, trimmed, and soldered with a minute piece of solder, which should

not cover the pure gold at all except where it adjoins the post. The disk and post are now returned to the root and tested. The gold is so soft that if not properly adapted it may be pressed to place with a foot plugger or other instrument. This should be unnecessary if swaging, etc., has been carefully done, and the impression was good. The subsequent procedure is the same as Goslee's. An impression is taken with post and disk in place, a tooth selected, fitted, backed, and attached to the disk by solder and completed.—NORMAN W. WHITE, *Commonwealth Dental Review*.

**A New and Very Expeditious Way of Constructing a Well-fitting and Inexpensive Pivot Crown.**—A pivot crown for temporary use, for hospital cases, or for any purpose which demands ease of construction and low cost, can be produced by the method described below.

The writer, in experimenting to produce a crown to do temporary duty (during the time a bridge including the same tooth was constructed), hit upon the idea, and found it worked so successfully that he now constantly uses it. Perhaps there is nothing very novel in the construction, but it seems to be such a time-saver as to merit a short description.

Cut off the natural crown in the usual way, shaping the root with a marked bevel, both to the lingual and labial side. Enlarge the root-canal with suitable reamers, and select one of Ash's crown posts of a suitable length for the root. These posts, which are strong and nicely tapered, are made with a little diaphragm or shoulder, which divides the pin into an upper and a lower part. By choosing what is called an "offset" post, or by inserting the lower part of the post in an Ash's post-bending tool and bending back the upper part; the latter is bent inward out of the way of the tooth pins. Choose an ordinary gold-clad pin tooth (solila or anatiform) which will suit the case, and grind it to fit the root. Soften a very small ball of pink modeling wax, and having pushed the upper part of the post into it up to the shoulder, press the chosen tooth into an approximately correct position relative to the post. Again soften the wax slightly. Place the post in the root, and at the same time force the tooth into an accurate position, and knead the ball of wax to cover the root and the back of the tooth. Take out, chill, trim up, and retry. In the workroom fit a sprue to the wax on the mesial or distal surface of the tooth, and at right angles to the post. Invest, and burn out the wax. Cast cold with acolite.

and a strong, well-fitting pivot crown is the result.

With regard to the speed of making such a crown, the writer (who makes no claim to work quickly) recently cut off a central incisor, prepared the root, and fitted the crown in wax in half an hour; while another half-

hour served to have it invested, cast, and polished. One should, in criticizing this, remember that it is in no sense a ready-made or store crown, but fits as perfectly as it is possible to adapt any crown, however laborious the method.—NORMAN BLACK, *British Dental Journal*.

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## OBITUARY

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### Dr. Nathaniel Gildersleeve.

DIED, Tuesday, November 11, 1919, at his home in Lansdowne, Pa., from rectal carcinoma, NATHANIEL GILDERSLEEVE, M.D.

Dr. Gildersleeve was born at Cochection Centre, Sullivan County, N. Y., on October 2, 1871. He received his early education in the public schools of New York State. In 1887 his family moved to Forest County, Pa., where he was employed for several years in the tanning and lumber business. He entered the Medical School of the University of Pennsylvania in September 1896, receiving the degree of Doctor of Medicine in June 1900.

In 1900-01 Dr. Gildersleeve held the Thomas A. Scott Fellowship in Hygiene at the University of Pennsylvania, and later became Assistant, then First Assistant and Associate Professor of Bacteriology in the University. In 1914 he was elected Professor of Microbiology and Bacteriology in the Thomas W. Evans Museum and Dental Institute of the University of Pennsylvania.

Dr. Gildersleeve was engaged in teaching and investigation during this whole period and contributed a number of publications on Bacteriology, Pathology, and Sanitation. He had engaged to some extent in the practice of Medicine, being connected with the Out-Patient Department of the University Hospital (Medical) for two years and the Skin Clinic of the Polyclinic Hospital for two years. He became pathologist in the Bar Harbor Hospital in 1904, conducting a Diagnostic Laboratory there during the summer months.

The death of Dr. Gildersleeve is a loss

which is keenly felt by all who were privileged to know him, but in a larger sense his passing away is a loss to biologic science, and particularly in that field now developing such primary importance, the relation of oral infections to bodily disease. By natural endowment and by special training Dr. Gildersleeve was highly fitted for research work and teaching in this, his chosen field of activity. In mind and character he possessed that love of truth which above all things else is the *sine qua non* of scientific success. Possessed of untiring energy and the rare faculty of imparting to others the knowledge he had himself acquired, he was a successful and inspiring teacher. Above all, he was the exponent of rationalism in his work, and his success in imbuing the minds of his students with the necessity for solving their problems in pathology in the light of their scientific findings in the laboratory as a check against the errors of purely clinical and theoretical observations made him a sound and safe guide in the education of those entrusted to his leadership. Cut down early in the full tide of his activities, he had yet achieved a world-wide reputation as an authority on his subject. Among his friends he was honored and beloved for the remarkable and unusual elements of the character he was.

Dr. Gildersleeve was a member of the Phi Sigma Kappa (General) and Alpha Kappa Kappa (Medical) Fraternities and of the Sigma Xi Honorary Scientific Fraternity. He was a member of the College of Physicians of Philadelphia, the American Medical Association, the Philadelphia County Medical So-



ciety, the Pathological Society of Philadelphia, the Philadelphia Pediatric Society, the American Association of Pathologists and

Dr. Gildersleeve was married June 1909 to Miss Elizabeth Stewart of Philadelphia, who, with four small children, survives him.



DR. NATHANIEL GILDERSLEEVE.

Bacteriologists, the American Association for the Prevention of Tuberculosis, and the Society of American Bacteriologists.

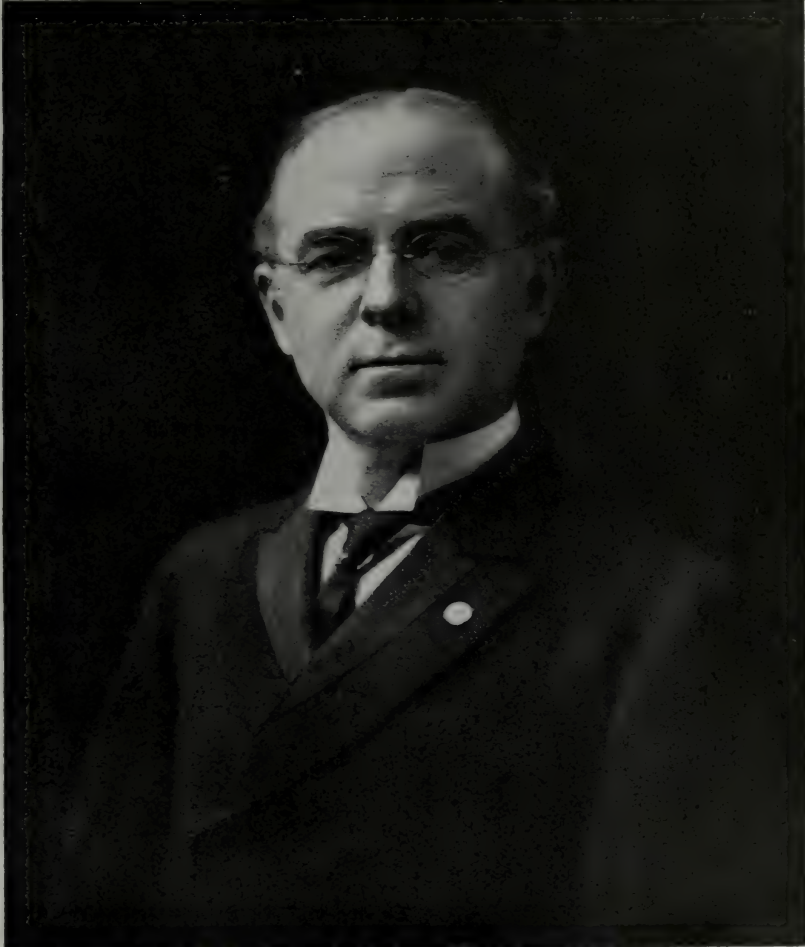
His remains were interred in Laurel Hill Cemetery, Philadelphia, Friday, November 14, 1919.

**Dr. Charles S. Butler.**

DIED, suddenly, of heart failure, November 1, 1919, in his sixty-seventh year, CHARLES S. BUTLER, D.D.S.

Dr. Butler was born in Buffalo, May 28, 1853. Early in life he became interested in

Immediately after his graduation he returned to Buffalo, where he began the practice of his profession and continued to practice until May 1916, when he gave up practice to accept a position with the Presbyterian Board of Home Missions, in which work he had been intensely interested and active for some years



**DR. CHARLES S. BUTLER.**

the practice of dentistry and in 1875 he entered the office of Dr. M. B. Straight of Buffalo, to prepare himself for the college dental course, as was the custom at that time. He later entered the Philadelphia Dental College and graduated from that institution in 1876, receiving the D.D.S. degree.

previous to his entering the mission field as his life-work.

Dr. Butler was a thorough Christian gentleman and for many years was an active worker in the Presbyterian Church in Buffalo. In soul, mind, and heart, Dr. Butler's religious tendencies were always apparent, and



the influence that his life exerted over his friends and acquaintances was that of the Christian.

Dr. Butler was well known and held in highest esteem as the secretary of the National Dental Association from 1903-1910. He was also recording secretary of the Dental Society of the State of New York from 1891-1898. He also served his local society, the Eighth District Dental Society of New York, in the capacity of recording secretary for six years and became its president in 1890.

Dr. Butler was ever interested in the advancement of the practice of dentistry and his one endeavor, from the time of his entrance into the profession to the time of his retirement, was in the interest of the betterment of the dental profession. One of his close friends in the profession, and one who loved him like a brother, has said of him, "In the practice of dentistry and during his entire life, whatever was for its advantage or its betterment was never counted too great an effort for him to gladly undertake."

Dr. Butler was well and favorably known in Masonic circles, having been Past Master Washington F. and A. M. Lodge; Past Master Keystone Chapter, Commander Hugh dePayne Commandery; Senior Warden Scottish Rite.

Dr. Butler was married in 1880 to Miss Katharine H. Worth who, with one daughter and one son, survives him. He was buried with Masonic honors in Forest Lawn Cemetery, Buffalo, N. Y.

## "In Memoriam" Resolutions.

### Dr. Newell Sill Jenkins.

THE following resolutions on the death of Dr. NEWELL SILL JENKINS were adopted by the National Dental Association:

*Whereas*, the members of the National Dental Association having learned of the death of Dr. Newell Sill Jenkins; and

*Whereas*, the name of Dr. Jenkins having been associated with all that was highest and best in dental practice for many years; and

*Whereas*, his long service in Europe and his wide knowledge of men and events having given him an international reputation second to none; and

*Whereas*, his delightful and charming personality added to his ability as a practitioner, made him a commanding figure in the profession; therefore be it

RESOLVED, That this Association places on record its high appreciation of his many sterling and lovable qualities, and its sorrow at his decease; and be it further

RESOLVED, That a copy of these resolutions, as an evidence of our affection and as an expression of our sympathy, be conveyed to the family of Dr. Jenkins, and preserved in the minutes of the Association.

TRUMAN W. BROPHY,

WALDO E. BOARDMAN,

HOMER C. BROWN, *Chairman*,

*National Dental Association Committee.*

# ARMY AND NAVY DENTAL NEWS

## Appointments.

### Dental Corps.

*Week ending December 5th.*

To be FIRST LIEUTENANTS: Page P. A. Chesser, Ralph E. Morgan, Joseph A. Murray, Clarke W. Russell, Joseph H. Jones, Forest V. Bockey, James L. Olsen, Glenn D. Lacey, Harold S. Whitney, Alexander MacK. Telfer, Egbert W. van D. Cowan, Clyde W. Scogin, Beverley M. Epes, and Warren C. Caldwell.

## Assignments.

### Army Dental Corps.

*Week ending November 8th.*

Col. Franklin F. Wing to Fort Sam Houston, Tex., for duty as department dental surgeon.

Maj. Don G. Moore to Walter Reed General Hospital, D. C., for duty.

Maj. Adolphus E. Worsham to Camp Holabird, Md., for duty.

Maj. Rex McK. McDowell, to Brooklyn, N. Y., army supply base medical section for duty.

Capt. John L. Smeltzer to Camp Gordon, Ga., for duty.

Capt. Joseph E. Eden to Camp Zachary Taylor, Ky., for duty.

1st Lieut. Clarence C. Olson to Camp Gordon, Ga., for duty.

1st Lieut. Leonard C. Murphey to Fox Hills, N. Y., general hospital 41, for duty.

1st Lieut. Albert W. Harrison to Camp Zachary Taylor, Ky., for duty.

*Week ending November 15th.*

Lieut.-col. George H. Casaday report to commanding general western department, San Francisco, for duty as department dental surgeon.

Maj. James G. Morningstar to Charleston, S. C., for duty.

Capt. Lynn H. Tingay to Camp Gordon, Ga., for duty.

Capt. James M. Ackley to Norfolk, Va., army supply base, for duty.

*Week ending November 22d.*

Capt. Boyd L. Smith to Fort Monroe, Va., coast artillery training center, for duty.

1st Lieut. Frank P. K. Barker to Camp Holabird, Md., for duty.

1st Lieut. Fay T. Bowen to San Antonio, Tex., air service flying school, Brooks Field, for duty.

*Week ending November 29th.*

Lieut.-col. Thomas L. Smith to Carlisle, Pa., general hospital 31, for duty.

Maj. Earl L. Hering to Camp Jackson, S. C., for duty.

Maj. Leslie D. Baskin to Oteen, N. C., general hospital 19, for duty.

Maj. Jacob L. Brause and 1st Lieut. William C. Holland to Camp Meade, Md., for duty.

Capt. Daniel S. Lockwood to Camp Custer, Mich., for duty.

Capt. Harry Holmes to Camp Benning, Ga., for duty.

Capt. Thomas H. Veale to Camp Devens, Mass., for duty.

1st Lieut. James P. D. Mason to Fort Douglas, Utah, war prison barracks, for duty.

1st Lieut. Walter D. Love to Mitchell Field, N. Y., for duty.

*Week ending December 5th.*

Lieut.-col. E. Henry Valentine to Camp Jackson, S. C., for duty.

Maj. John L. Schoek and Capt. Nathan C. Pickles to San Francisco and to Manila, P. I., about January 5th, for duty.

Majs. Thomas C. Daniels and James L. P. Irwin from duty in Philippine Department to United States and report for instructions.

Capt. Waldo J. Adams to Whipple Barracks, Ariz., general hospital 20, for duty.

Capt. Merle W. Catterlin to Fort Sheridan, Ill., general hospital 28, for duty.

Capt. Julius Link Bischof to Denver, Colo., general hospital 21, for duty.

Capt. Solomon J. Z. Gantz to Camp Lewis, Wash., for duty.

Capt. Leroy T. Asche to Governor's Island, N. Y., for duty.

The following honorably discharged as colonels only: Cols. Samuel H. Leslie and Frank P. Stone.

The following honorably discharged as



lieutenant-colonels only: Lieut.-cols. Lee S. Fountain, E. Henry Valentine, and Charles M. Taylor.

The following honorably discharged as majors only: Majs. Leslie D. Baskin and William C. Webb, Jr.

*Week ending December 12th.*

Maj. Neal A. Harper to Governors Island, N. Y., for duty.

Capt. Arthur T. Burchill to Montgomery, Ala., aviation repair depot, for duty.

1st Lieut. Harold S. Whitney to Carlisle, Pa., general hospital 31, for duty.

**Navy Dental Corps.**

*Week ending November 8th.*

Lieut. A. W. Chandler, detached from receiving ship at New York; to duty at navy yard, New York City.

Lieut. Francis S. Weir, detached from receiving ship at New York; to navy yard, Philadelphia, Pa.

Lieut. Joseph C. Munster, detached from navy yard, New York City; to Paris Island.

*Week ending November 15th.*

Lieut. Ethan W. Scott, detached from Unalgo; to the naval training station, San Francisco.

*Week ending November 22d.*

Lieut. Leonard L. Martin, detached from naval training camp, San Francisco; to duty on the Texas.

Lieut. Charles S. Weigester, detached from naval training station, Newport, R. I.; to naval dispensary, Navy Department, Washington, D. C.

*Week ending December 5th.*

Lieut.-commander Alexander G. Lyle, detached from navy yard, Boston; to U. S. S. Tennessee.

Lieut. L. C. Frost, detached from Lafayette radio station, Croix d'Gironde, France; report U. S. naval port office, Brest, France.

*Week ending December 12th.*

Lieut. Albion C. Tollinger, detached from navy yard, Philadelphia, Pa.; to marine barracks, navy yard, Philadelphia.

## **Preparedness League of American Dentists.**

ORGANIZED UNDER THE AUSPICES OF THE N. D. A.

Office of J. W. BEACH, *President*, 131 Allen St., Buffalo, N. Y.

### **The French-Belgian Dentists' Relief Fund.**

WE are glad to report the receipt of more contributions to the League fund for French and Belgian dentists who have suffered so severely from the war. As American dentists we should deem it a distinct privilege to give aid to our unfortunate brothers, for the benefits we enjoy are greater than those of any similar body of men in the whole world and our incomes are far in excess of any previous time.

Let us not forget that to give is but to receive, and the giver is the one who becomes greatly enriched thereby. Did you ever stop to question the ownership of the worldly goods in your possession? No doubt it would

require much argument to convince you that you do not own the property in your possession, that the money you have earned by years of unremitting toil is given you to be held in trust for others. In a few years it must pass on to another link in the endless chain signified by birth and death, and will it not give you much satisfaction and comfort to know that you have transferred a due proportion of it to the welfare of your suffering brother dentists in devastated France and Belgium? There are about five hundred dentists, a good many widows, and many children to be looked after. Will you not dig deep into your pockets and bring forth all you can possibly spare for this grand cause?

We earnestly urge all members of the

League to rally to the cause and contribute at least one dollar each and thereby assist in making this object the success it merits. We have appointed a commission to represent the League of Drs. Georges Villain, Wm. Slocum Davenport, and Richard Burkhart, all of Paris. Following are letters recently received:

6 Avenue de l'Opera,  
PARIS, Oct. 19, 1919.

Dr. J. W. BEACH,  
131 Allen St.,  
Buffalo, N. Y.

*My dear Dr. Beach,*—It gives me great pleasure to act with Drs. Villain and Burkhart on the Commission to collaborate with the Aide Confraternelle aux Dentistes Français et Belges, Victimes de la Guerre, the acceptance of which I cabled you.

It is a great personal satisfaction to know the great interest the American dental profession takes in this most excellent work.

The Aide Confraternelle is composed of men who stand high in the profession, who have labored during the war under most trying conditions and are now most grateful for your assistance. I might mention the fact that Dr. I. B. Davenport, my brother, is vice-president of the organization and was one of the founders. Your Committee has had two meetings with the Aide Confraternelle and will be kept in constant touch with all of its proceedings.

As I cabled you "Funds Urgent" with the present exchange 8.665 every dollar will count. A few weeks ago the exchange was 9.13, but no doubt that phase of the question will be carefully watched by you in America.

The conditions in Paris have much improved in many ways. The French dental profession has made a fine showing in army and hospital work and we anticipate a better

recognition for them in the near future, as you have attained in America.

My dear President, it is a privilege to be called upon to work with you in the interest of our French *confrères* who have always shown Americans every courtesy.

Ever fraternally yours,

WM. SLOCUM DAVENPORT.

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*EXTRACT FROM LETTER RECEIVED  
FROM DR. RICHARD BURKHART  
OF PARIS.*

As Dr. Davenport writes and cabled the Aide Confraternelle needs money. It is now looking after about seventeen children and several widows, as well as receiving requests for help from many dentists. This is about as representative and active a group of French dentists as can be gotten together, are very fine men, and deserving of a great deal of credit for the work they have done and are trying to do.

The Aide Confraternelle gives money to buy equipment to any deserving dentist or helps the family of any. The Aide Confraternelle has helped some Belgians and as far as I can see is not at all partisan, but willing to help all.

With the exchange as it now stands we can do more good by getting all available money as soon as possible.

We are planning to try and make dentists of all of these children, which surely is a good thing.

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Kindly send all contributions to Dr. L. M. Waugh, 576 Fifth ave., New York, N. Y., who is Treasurer and will acknowledge all receipts and render a strict accounting of all disbursements.

J. W. BEACH, *President.*



# SOCIETY NOTES AND ANNOUNCEMENTS

NOTICES should reach the Office of the DENTAL COSMOS *not later* than the 11th or 12th of the month preceding that of publication.

## American Institute of Dental Teachers.

THE next annual meeting of the American Institute of Dental Teachers will be held at Detroit, Mich., January 27, 28, and 29, 1920. Hotel Statler will be the headquarters. A cordial invitation is extended to all persons interested in dental teaching.

RUSSELL W. BUNTING, *President*,  
ABRAM HOFFMAN, *Sec'y*,  
381 Linwood ave., Buffalo, N. Y.

## American Society of Orthodontists.

THE next annual meeting of the American Society of Orthodontists will be held at the Edgewater Beach Hotel, Chicago, Ill., Monday, Tuesday, and Wednesday, April 5, 6, and 7, 1920. Those interested in orthodontia are invited to attend.

J. V. MERSHON, *President*,  
Philadelphia, Pa.  
F. M. CASTO, *Sec'y*,  
Cleveland, Ohio.

## Dental Library and Museum Association.

THE first annual meeting of the Dental Library Association (National Association of Dental Librarians) was held during convention week in New Orleans.

The activities of the association were broadened so as to include museums as well as libraries. Its purpose will be the fostering and creating of dental libraries and museums, at the same time bringing about a closer relationship among those interested in the making of dental libraries and museums.

One of the most important functions of the association will be the means of exchange of dental literature and specimens. Under

the exchange the following objects are in view: An exchange of library and museum duplicates, securing libraries, instruments, and specimens of retired or deceased dentists, securing distribution of transactions of dental societies, reprints of scientific papers, and reports of societies, for securing endowments of dental libraries and museums, supplying special information on rare works in single libraries, on library and museum management, technique, devices, bindings, etc.

With a view to the further promotion of these objects, the secretary invites all who have this work at heart to join the association, either as a society, college, or individual member. Until the permanent constitution has been adopted, the dues will be \$2 a year.

We desire information as to what collections have thus far been made or may be in contemplation, the purpose being to publish later a list of dental libraries and museum workers.

For further information and membership blanks kindly communicate with the secretary.

A. F. ISHAM, *President*,  
B. W. WEINBERGER, *Sec'y*,  
40 East 41st st., New York City.

## St. Louis Study Club.

### SEMI-ANNUAL CLINIC.

THE semi-annual clinic of the St. Louis Study Club will be held at Hotel Jefferson, the afternoon of January 10th. The following fall courses will have been completed at that time: "Porcelain Technic," Dr. J. D. White. "Vital Abutment and Porcelain Root Bridges," Dr. E. R. Hart. "Crown and Bridge Technic," Dr. Otto J. Fruth and Dr. Malcolm Robb. "Radiodontia," Dr. C. O. Simpson. "Root-Canal Technic," Dr. W. A. Chamberlain. "Conductive and Infiltration Anesthesia," Dr.

E. C. Engel. "Full Denture Technic," Dr. E. B. Owen. "Oral Pathology," Dr. Virgil Loeb. "Bacteriology," Dr. B. J. McMahon.

The clinical program will consist of group clinics by each of the classes to demonstrate the methods and technique taught, and individual clinics in which all ethical members of the profession are invited to participate. An informal dinner will follow the clinic, at which the organization of other classes will be effected. Detailed information concerning the clinic and study courses may be obtained from Dr. F. C. Rodger, Wall Bldg., St. Louis.

CLARENCE O. SIMPSON,  
*Chairman Publicity.*

### **Academy of Stomatology of Philadelphia.**

THE section on Anesthesia of the Academy of Stomatology will conduct their seventh annual research on the "Changes Produced in the Blood by Nitrous Oxid-Oxygen Anesthesia," on January 8, 9, and 10, 1920.

T. D. CASTO,  
Philadelphia, Pa.

### **Alumni Association of the Washington University Dental School.**

THE annual meeting of the Alumni Association of Washington University Dental School of St. Louis, Mo., will be held February 23 and 24, 1920, at the College Building, 29th and Locusts sts. A postgraduate course will be given with some of our best men in dentistry giving lectures, the names to be announced later. Be sure to keep this date open. Everybody welcome.

A. V. SANDERS,  
*Chmn. Publicity Committee,*  
University Club Bldg., St. Louis, Mo.

### **Illinois State Dental Society.**

#### **CHANGE OF DATES.**

THE fifty-sixth annual meeting of the Illinois State Dental Society will be held in Chicago, beginning Monday, March 22, 1920, and continuing for four days. Headquarters will be at the Congress Hotel, where sessions, clinics, and exhibits will be housed.

J. P. LUTHRINGER, *Sec'y,*  
Peoria, Ill.

### **Vermont State Dental Society.**

THE Vermont State Dental Society will hold its next annual meeting in Burlington on Wednesday, Thursday, and Friday, March 17 to 19, 1920.

PHILIP E. MELLEN, *Sec'y,*  
Middlebury, Vt.

### **Alumni Society of the Dewey School of Orthodontia.**

THE next annual meeting of this society will be held on April 1, 2, and 3, 1920, at the Edgewater Beach Hotel in Chicago. The usual high standard of the meetings of this society will be maintained. One half-day will be devoted to clinics. All interested in orthodontia are cordially invited to attend these meetings.

GEORGE F. BURKE, *Sec'y,*  
741-43 David Whitney Bldg., Detroit, Mich.

### **Arizona State Dental Society.**

THE annual meeting of the Arizona State Dental Society was held in Phoenix, November 5, 6, and 7, 1919.

An interesting program was rendered and the following officers were elected for the ensuing year: John T. Dunlap, president; W. G. Barackman, vice-president; J. C. Roberts, sec'y-treasurer.

J. C. ROBERTS, *Sec'y-Treasurer,*  
Phoenix, Ariz.

### **North Carolina Board of Examiners.**

THE next meeting of the North Carolina State Board of Dental Examiners will be held at Charlotte, N. C., beginning promptly at 9 o'clock on Thursday, January 15, 1920.

For further information and application blanks, address

F. L. HUNT, *Sec'y,*  
Asheville, N. C.

### **Florida Board of Examiners.**

THERE will be a special session of the Florida State Board of Dental Examiners, January 15, 1920, at 7.30 P.M., in the office of the secretary, Jacksonville, Fla., for the purpose of examining all qualified applicants who may come before them at that time.

For further information address

R. P. TAYLOR, *Sec'y,*  
414-15 St. James Bldg., Jacksonville, Fla.



### Montana Board of Examiners.

THE Montana State Board of Dental Examiners will hold their regular examinations at Helena, Mont., January 12, 1920. Applications should be in the hands of the secretary at least ten days before the examinations.

T. M. HAMPTON, *Sec'y*,  
Helena, Mont.

### South Dakota Board of Examiners.

THE next meeting of the South Dakota State Board of Dental Examiners will be held in Sioux Falls, S. D., January 7, 8, and 9, 1920, beginning promptly at 9 A.M. January 7th. All applications must be in the hands of the secretary by January 1st. Fee

for examination, \$25; no reciprocity or interchange.

Full information and application blanks may be received by addressing

L. S. SPENCER, *Sec'y*,  
Watertown, S. D.

### Delaware Board of Examiners.

THE Delaware State Board of Dental Examiners will meet for the purpose of examining candidates for license to practice in Delaware, at Wilmington, Municipal Bldg., January 14 and 15, 1920, at 9 A.M.

For further information address

WARREN S. P. COMBS, *Sec'y*,  
Middletown, Del.

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# UNITED STATES PATENTS

## PERTAINING OR APPLICABLE TO DENTISTRY

ISSUED DURING NOVEMBER 1919.

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#### November 4.

- No. 1,320,583, to WILLIAM M. STANBROUGH. Stand for dental articulators.
- No. 1,320,616, to GEORGE S. HAMPE. Rotary toothbrush.
- No. 1,320,824, to E. E. BAILEY and J. H. JACOBS. Apparatus for casting dental inlays.
- No. 1,320,900, to ELMER I. MCKESSON. Respirator.
- No. 127,302, to WILLIAMS BRUSH CO. Trade-mark for toothbrushes.

#### November 11.

- No. 1,321,124, to ALBERT D. PENTZ, JR. Art of restoring teeth.
- No. 1,321,126, to G. W. RAMSEY and G. E. FRITZ. Anchor for artificial teeth.
- No. 1,321,130, to FRANK F. SCHLEUTER. Dental drill.
- No. 1,321,452, to JAMES W. IVORY. Rubber dam punch.
- No. 1,321,465, to HECTOR P. MACLAGAN. Dental film holder.

#### November 18.

- No. 1,322,355, to HERMAN SCHREIER. Denture attachment and means for applying the same.
- No. 1,322,386, to WALTER J. WILSON. Dental articulator.
- No. 1,322,387, to WALTER J. WILSON. Motor-driven dental articulator.
- No. 1,322,413, to JACOB H. EKMELJIAN. Fountain toothbrush.
- No. 1,322,424, to ERNEST GARDEN. Process in forming metal backs for artificial teeth.
- No. 127,621, to IODENT CHEMICAL CO. Trade-mark for tooth paste.
- No. 127,694, to BURTON E. TURNEY. Trade-mark for dental creams.

#### November 25.

- No. 1,322,994, to EDWARD H. ANGLE. Orthodontic appliance.
- No. 1,323,042, to JOSEPH A. GARDNER. Toothbrush.
- No. 1,323,057, to MINOR T. HOLLIDAY. Toothbrush.
- No. 1,323,141, to JACOB LOWER YOUNG. Orthodontia appliance.







DR. WILLIAM W. BELCHER.

# THE DENTAL COSMOS

VOL. LXII.

FEBRUARY 1920.

No. 2

## ORIGINAL COMMUNICATIONS

### A Practicable Root-canal Technique.

#### IV: Instrumentation of the Canal.

By ARTHUR B. CRANE, D.D.S., Washington, D. C.

(Continued from page 77.)

#### OBTAINING FREE ACCESS.

IT has been pointed out that before entering the pulp chamber an attempt should be made to sterilize the coronal dentin. Thereafter the rubber dam should be applied and the coronal cavity so shaped that free direct access may be had to each canal in a line with its long axis. It is unfortunate that this often means extensive destruction of sound tooth substance, but even if the whole crown must be sacrificed the procedure is justified. The coronal opening corresponds to the primary incision in any other surgical operation, and as the object here is the safety of the root, as much of the crown should be sacrificed as may be necessary to prevent failure. (Fig. 1.) Wherever possible, the natural walls of the pulp chamber should be preserved, as these will guide the broach naturally into the canals. The best method is to enlarge the cavity of access

until the roof of the pulp chamber consists of only a thin layer of dentin, and then remove this with chisels and hoes. (Fig. 2.)

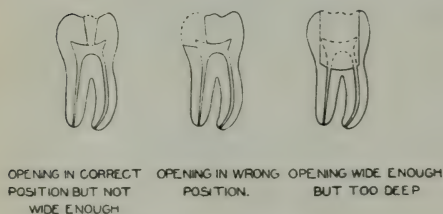
In bicuspid and molars it is always necessary to enlarge mesial cavities well into the occlusal surface, and frequently, when the decayed or filled cavity is distal, it will be expedient to cut somewhat into the mesio-buccal surface as well. Those familiar with the Black system of cavity preparation will understand how to shape these cavities so as not to weaken the tooth. The cutting is best done with a round or inverted cone bur, care being used to prevent its plunging into the pulp chamber. No overhanging walls should be left at any point. In incisors and cuspids the lingual wall must generally be cut away, no matter where the cavity of decay exists. Enough dentin should be removed toward the incisal surface to completely expose the horns of the pulp. In either class of teeth, should the broach



bind on any of the cavity walls, when inserted in the canal, more cutting should be done in that direction until the broach is absolutely free.

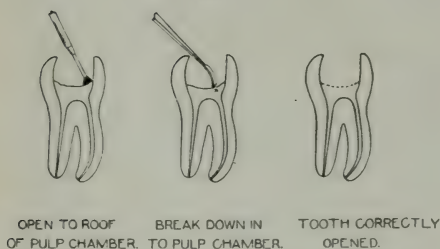
The conscientious operator will have made a careful study of dental anatomy and be aware of the normal number and location of the canals in each type of tooth. Variations from the typical are to be expected and looked for. There are often two distal canals in the lower

FIG. 1.



Incorrect technique.

FIG. 2.



Correct technique.

first molar. The mesio-buccal root of the upper first molar sometimes contains two canals. There are not a few lower second molars with only one large canal and upper second molars with one or two canals only. Lower bicuspsids are found with two canals and upper second bicuspsids frequently have two. I have encountered three lower cuspsids with two well-defined canals and a few upper cuspsids with a second canal running into a rudimentary root. The lower third molars may have from one to four canals and the upper as many as seven. The possible presence of such abnormalities

should serve to keep the operator always on guard, for no matter how well the canals which are found are managed, an untreated canal will entirely vitiate the result. On the other hand, if a canal cannot be found it will do no good to form an artificial one, and this attempt generally results in puncture of the root.

When difficulty arises in the search for the canals, it is generally because the floor of the pulp chamber has been mutilated. Other factors tending to impede progress are insufficient access, previous canal fillings or chips of dentin in the canal orifice. If the radiograph indicates that the canals are blocked by fillings, some solvent should be used. For gutta-percha the pulp chamber should be flooded with xylol, which in a few minutes will so soften this material that the finder will slip into the canal. If the obstruction is of cement or a proprietary root-filling, the canals may be located by painting the floor of the pulp chamber with iodine. When this is washed out with alcohol the root-filling will retain the stain.

If the orifice of the canal is filled with chips of dentin, pulp stones or hardened pulp tissue, a small piece of sodium-potassium should be placed in the pulp chamber and spread evenly over the floor. A broken root pick sharpened to a point is then used to systematically sweep this surface until it becomes engaged in the orifice of the canal. When this fails, occasionally a fifty per cent. sulfuric acid followed by bicarbonate of soda will succeed. The temptation to use a bur in an attempt to uncover the canal in these cases is sometimes almost irresistible, but to do so is sure to complicate matters still further.

#### EXPLORATION OF THE CANAL.

Having located the canals by whatever means, the work in the canal proper is begun by exploring to its apical extremity. Upon the complete accomplishment of this task the success of the subsequent work depends. There are certain canals which cannot be so explored by any technique at present available, but the pro-

portion of such is much less than it would seem to the inexperienced.

A fine, smooth broach of piano wire is the only instrument which can be depended upon to do this part of the work with safety. The Rhein root pick, the Twentieth Century pathfinder and the Kerr root probe are all instruments designed for this purpose. The Kerr set contains the finest instrument of this type, not much thicker than a hair, which is often very useful, but these probes are made of blued steel, which makes them difficult to see in operation. The pathfinder is a long delicate instrument with which good work may be accomplished, but the flexibility of the long shank confuses the sense of touch to some degree. For routine work the Rhein picks, which come in four sizes, are admirable.

Selecting the smallest size the attempt is made to follow the canal to the apical opening by a series of pushing and picking motions. (Fig. 6 A.) If the progress of the broach is stopped a comma-like turn given to the extreme point of the instrument will frequently allow it to proceed. If this fails, sometimes a slight quarter-turn twisting motion given just at the impact of the picking motion will cause it to pass the obstruction. No great force should be used, however, and where purely mechanical exploration fails chemical aid is indicated. This should not be undertaken blindly, but the cause of the obstruction should be ascertained if possible.

#### THE CALLAHAN METHOD OF REMOVING ORGANIC MATERIAL.

Acids should be used for inorganic blockade, alkalies for organic, and suitable solvents for previous canal fillings.

The principal acids used for this purpose are thirty per cent. sulfuric, phenol-sulfonic and hydrochloric. The life-work of Callahan with the sulfuric acid gives it pre-eminence and, where indicated, it renders a useful service. An applicator may be made of fine iridium-platinum wire, filed to a taper point and somewhat roughened with a coarse file. A saturated solution of bicarbonate of

soda in sterile water should subsequently be used for the double purpose of neutralizing any free acid remaining, and forcing out the débris by the bubbling which ensues.

#### THE SODIUM-POTASSIUM METHOD.

The principal alkalies are sodium-potassium, sodium-dioxid and sodium-hydroxid. Of this group the sodium-potassium is easiest to handle and meets all the requirements. The best form is Schreier's paste, which was obtainable in Germany before the war, but the S. S. White Co. makes a preparation which is quite satisfactory. It comes in a small glass tube which can be kept sealed with wax when not in use. In use the tube is nicked with a knife-edged file just above the point where the silver color shows the alloy unchanged, and the tube broken off at this point. A white substance forms at the top of the tube from contact with air and this should be discarded. The point only of the pick is dipped into the sodium-potassium and it should merely be painted with the alloy; that is, no lumps should adhere to the instrument. It may be more impressive to say, "Use sodium-potassium only in homeopathic doses." When this substance comes into contact with moist organic material there is a miniature explosion, attended by flame and smoke, caused by the rapid oxidation. In this reaction some of the organic material is actually consumed and some is saponified. The use of sodium-potassium in the canal is only occasionally attended by explosion, hence the saponified tissue must be washed out of the canal, for which purpose alcohol is an efficient medium. Repeated applications will eventually remove any organic blockade.

As previously stated, alkalies are indicated for organic obstructions, but where the closure is caused by a calcific nodule or a constriction of the canal walls, sodium-potassium will more quickly effect a passage than acids. This is because it destroys the organic cementing stroma of the dentin as well as the organic matter in the dentinal tubuli, leav-



ing the inorganic portion in such form that it is readily pulverized by the broach. Thus it is the best chemical aid for routine use in removing natural obstructions.

Gutta-percha is the most frequently encountered artificial obstruction. For dissolving this, chloroform, eucalyptol or xylol may be used. The latter possesses many advantages over the other two and in a few minutes will so soften the hardest gutta-percha that the pick will pass through it.

Obstructions caused by proprietary root pastes will be slowly softened by sulfuric acid, in the rare event that they are hard enough to offer any resistance to the passage of the pick. Gold or cement must be painstakingly picked out. A stiff, pointed instrument made of a broken root pick is most useful for this purpose.

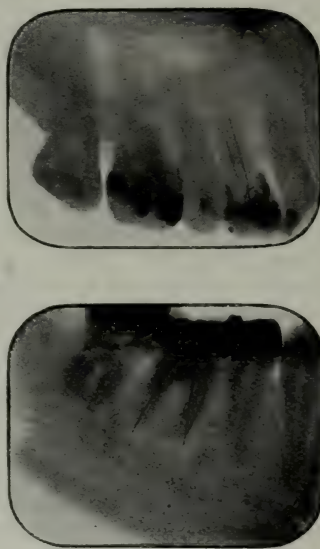
Broken instruments offer the greatest difficulty of any canal obstruction. It may here be pointed out, however, that this does not apply to smooth instruments broken off in the picking and pushing motion. If these are simply ignored for the time being and the picking and pushing resumed with a new instrument, the broken portion will soon ride out of the canal, but where an instrument is broken while being screwed into the canal further exploration is often impossible. By repeated use of sodium-potassium on a root pick, it is sometimes possible to make a pathway alongside of the obstruction, and then a twist broach may be passed into this and twisted around and around to the right, without permitting it to advance into the opening. When this does not work it is feasible occasionally to continue the picking alongside of the broken instrument and re-enter the canal at a point apical to it. When the broken piece projects periapically, extraction or root-resection is indicated.\*

\*Since writing the above, I have had some instruments made by the Twentieth Century Co. for opening canals which do not yield to the foregoing technique. The set consists of four instruments of the root-pick type,

#### THE DIAGNOSTIC WIRE.

After the canal has been explored as far as possible by the foregoing method, successive sizes of root picks, carrying smallest quantities of sodium-potassium should be used, passing them to the farthest point of exploration and then pressing around the side walls of the canal. (Fig. 6 A.) In this way the opening may be made large enough for the insertion of a diagnostic wire. (Fig. 3.)

FIG. 3.



Diagnostic wires.

For this purpose there is nothing better than a strand of ordinary braided picture wire. Enough of this to last a lifetime can be bought for five or ten cents, and it has all the qualities necessary for this use. Where the caliber of the canal

the modification being that the working point varies in length from one-eighth to one-half inch, thus increasing the relative length of the shank. If these instruments are used successively, beginning with the shortest, they will enable the operator to explore difficult canals without the buckling of the instrument interfering with the sense of touch. After the longest opener has been buried to its shank in the canal the root pick will usually complete the exploration.

permits, the diagnostic wire may be wrapped with cotton fibers and saturated with any medicinal agent indicated. The end of the wire which is to remain in the pulp chamber should be given a turn around the beaks of the cotton pliers so that it may readily be grasped for withdrawal.

After the insertion of the diagnostic wire a radiograph will indicate the extent to which the canal has been explored, and will be suggestive of subsequent procedure. If a portion of the canal is unexplored, where this is straight a stiff pick or fine root file may be used with considerable force to complete the open-

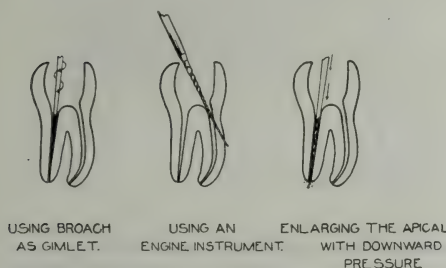
instrument within the canal, are other potent probabilities of such indiscretion. (Fig. 4.)

When the use of the canal openers fails to open the canal, the use of the finest Kerr root file or Young broach in quarter turns is sometimes indicated, but the frequent withdrawal and cleansing of the instrument must not be neglected.

If the canal cannot be explored to the end, it should be enlarged as far as possible, and the unfilled portion of the root subsequently resected.

Where previous partial root-canal fillings are found they should be completely removed prior to the attempt to explore the remainder of the canal. Most frequently an offset will have been formed at the extremity of the filling, by the

FIG. 4.



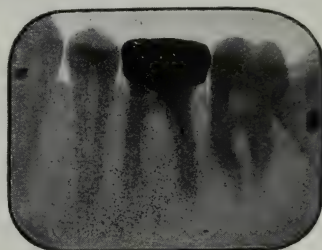
Common errors.

ing. If the canal is curved, the smooth broach should be curved to approximately the same degree and the gentle pushing and picking motions resumed, with the aid of the indicated chemical.

A common error in dealing with curved roots is to enlarge the canal with burs or reamers in the direction of the long axis of the unexplored portion. This possibly might be tried as a last resource, but to mutilate the canal with any instrument prior to exploring to the apical foramen is to invite almost certain failure to accomplish the desired result.

The attempt to use a broach of any kind as a gimlet or to use any instrument revolved by the engine will often result in forcing débris ahead until the canal is hopelessly occluded. The formation of an offset or shoulder, which will deflect the broach when again used, the puncture of the root, or the fracture of the

FIG. 5.



Offset clearly shown in distal canal of first molar.

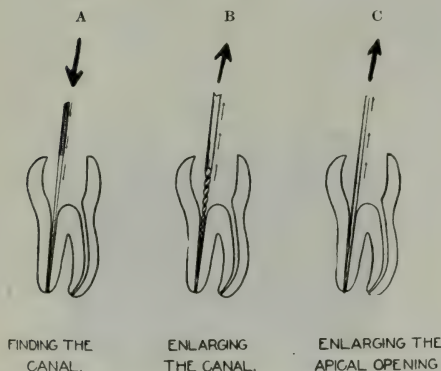
previous operation. (Fig. 5.) It is quite difficult in such event to find the continuation of the canal proper. This is best done by giving the comma-shaped curve to the end of the root pick. Then by picking away, revolving the instrument just a little with each pick, the point will often slip past the shoulder and continue on its apical journey. No attempt should be made to eliminate the shoulder until after the extremity of the canal has been opened by the smooth-broach sodium-potassium method, so as to admit the free insertion of the largest size Rhein pick. Then by adherence to the technique about to be described for enlarging and shaping the canal, the shoulder may be so rounded off that it will offer no interference in the placing of the filling.



## ENLARGING THE ROOT-CANAL.

Having reached the periapical tissue by some means, the next step is to enlarge and reshape the canal, thereby incidentally removing most of its original content, especially if judicious use is made of sodium-potassium. The object is to make the canal of such caliber that a sufficiently firm gutta-percha point may be employed in filling it, and to shape it to a conical form, so that when pressure is brought to bear on the gutta-percha cone at the canal orifice, it will be packed

FIG. 6.



Correct technique.

simultaneously against the side walls and the apex of the canal. *Correct cavity preparation is as essential to good canal filling as to coronal filling.*

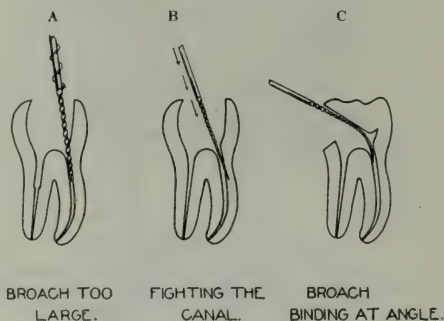
The desired result is safely obtained by the use of a graduated series of Kerr root-canal files. Young broaches, Donaldson barbed broaches, or Twentieth Century rat-tail files may be employed, but the Kerr file offers the most advantages.

The instrument first used must be of the smallest size and of no larger gage than the last smooth broach used in the exploring operation. With gentle pressure this is pushed to the end of the canal and withdrawn with lateral pressure. This is repeated again and again, always making the broach scrape toward the crown, never toward the apex, curetting systematically all around the canal. (Fig.

6 B.) The file should never be twisted into the canal, but its insertion may be aided by minute quantities of sodium-potassium. (Fig. 7 A.)

The next size larger file is now substituted, in the same manner pushing it to the apical opening and shaving the walls of the canal only upon withdrawal. By using successively larger sizes of files and repeating the technique just described, the canal, even if curved or twisted, can be enlarged to any size and will be formed to a conical shape. (Fig. 8.)

FIG. 7.



Incorrect technique.

The enlargement of the canal only upon the withdrawal of the instrument tends to carry most of the debris into the pulp chamber. This may be blown out from time to time with the chip blower, but while this is being done the broach should always remain in the canal to block the apical opening.

The toilet of the canal is accomplished with hydrogen-peroxid, to which bichlorid of mercury may be added in proportion of 1 to 500, if desired. A drop is placed at the canal orifice and is gently worked into the canal with a fine absorbent point. Care must be exercised to prevent blocking the canal with the cotton, as this would cause effervescence to take place apically.

## MANAGEMENT OF THE APICAL OPENING.

The management of the apical opening depends upon the type of filling to be in-

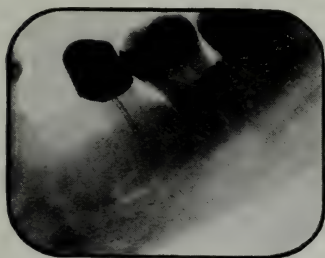


sented. Where periapical conditions are still normal and it is desired to confine the filling entirely within the canal, the apical opening should not be enlarged, but should remain as nearly normal as possible. Where periapical destruction has occurred and it is desired to project the filling material to form a cap for the root apex, the apical opening should be

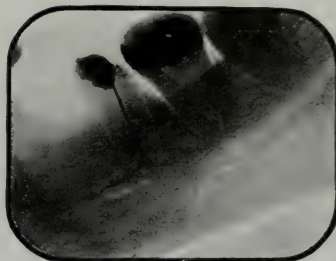
alternately giving quarter turns and withdrawing the instrument. There are several sizes of apexographers, and by using them successively the apical opening can be safely enlarged to meet the requirements of the case.

In curved or twisted canals, the smooth broach used in exploring will usually come out of the canal so bent to conform-

FIG. 8.



A



B

The result of one hour's work by technique herein described. A, Case as it presented.  
B, Diagnostic wire in position.

more or less enlarged depending upon the degree of disorganization. The Twentieth Century apexographer, or apex curet is an instrument ideally constructed for this delicate task. The finest size will readily pass through the apical foramen of the average tooth which has undergone the foregoing treatment, but will catch just a trifle upon withdrawal, thus enlarging the lumen and drawing the débris into the canal. (Fig. 6 c.) Where the natural opening is too small to permit the free passage of the smallest instrument, it may be worked through by

ity that it may be readily reinserted. A broach so shaped should be laid aside as a pattern by which to bend each instrument subsequently used in the canal. (Fig. 8.) Sometimes it is even expedient to bend the gutta-percha point to conform to this pattern.

After enlarging the apical opening the canal is again washed out with hydrogen-peroxid and is then ready for the process of disinfection.

921 15TH ST., N. W.

(To be continued.)

## Diseased Teeth and Antrum Complications.

By LANGDON S. CHILCOTT, D.D.S., Bangor, Me.

DENTAL SURGEON TO THE EASTERN MAINE GENERAL HOSPITAL.

IT is in no sense the purpose of this paper to recommend in a general way the referring of our patients to the exodontist, for it is our legitimate aim at all times to retain such of the teeth as are normal or can be made permanently serviceable, healthy and comfortable. But we should not hesitate to extract any tooth that is detrimental to the comfort of a patient in wearing an artificial denture or is an incurable factor in pathologic conditions.

We observe, very sorrowfully, the apparent fact that the necessity for extracting is constantly increasing. And if we should borrow the old "Spyglass," which was a creation of the New Departure Corps, and examine the general subject of dentistry by looking carefully into the small end of that instrument we would be appalled by what we find.

We are now passing an era in dentistry where attempts at conservation have been overdone. Some of us can remember the teachings of many leading practitioners of the late seventies who, in their writings, advocated the most radical conservatism and often impressed upon their readers that to extract a tooth was almost a crime.

Conservative treatment of the teeth was then the latest and most advanced idea in dentistry. It took deep root with the public, and the dentist who had to extract a tooth which had passed its usefulness, to relieve a patient of pain, was sometimes ridiculed.

The theory, in spite of its abuses, did have its merits and in the years that have passed has been a source of comfort to many patients, but our success too often over-stimulated our ambition and

our efforts have many times ended in disappointment. The discreet practitioner is today more often resorting to the use of the forceps than was done by men of his type a quarter of a century ago. This is not because of a change of heart or a relapse into antiquity, but is in accordance with a better understanding of conditions as we find them.

Under the influence of methods of diet among the most civilized races, for the past century or two, the human teeth are undoubtedly deteriorating. The periodontal membrane by losing its tenacity is responsible for a condition which we call Riggs' disease, the maxillary bones and alveolar processes appear to be diminishing in size and structure, roots of the posterior teeth in the upper jaw frequently perforate the antrum, over-conservatism is establishing a line of demarcation between good judgment and unwise treatment, and commercialized dentistry is leaving its trail of ruin.

We not only have the greatest respect for the dental practitioner who uses *conservative* conservatism in the treatment of his patients' teeth, but the highest appreciation for the dentist who employs crown and bridge work in a rational manner. Most readers will agree that the mouths of the people in this country today would be in a far better condition if a large percentage of the fixed substitutes had been omitted.

The modern car of dentistry is, under the influence of commercialism, being driven down grade in high gear and under full power. The crash is inevitable; the wreckage, human tissue, and the salvage, scrap metal.

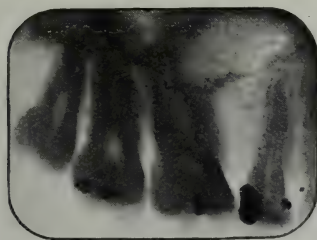
Need we wonder, when we consider all

this, that we are confronted with diseased teeth and antrum complications? The lesion is often obscure and diagnosis, a science in itself, difficult, and the most experienced operator will err at times. It requires much time and close application to become a competent diagnostician, and the most efficient should frequently employ the roentgen ray to assist in his conclusions. He must remember that the shadows of teeth cast upon the film

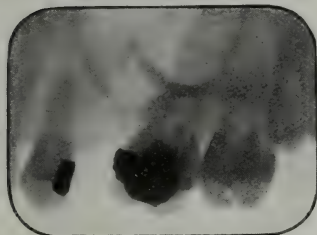
ous stages of necrosis, attached to the apices of their roots.

During the past decade there appears to have developed an unnecessary scare in regard to the teeth, and we have sometimes been embarrassed by the statement of patients who have informed us that "their doctor has ordered them to have all their teeth extracted." This unfortunate crisis, very happily, is passing and a more logical relationship between the medical and the dental practitioners is being established. We do not question

FIG. 1.



A

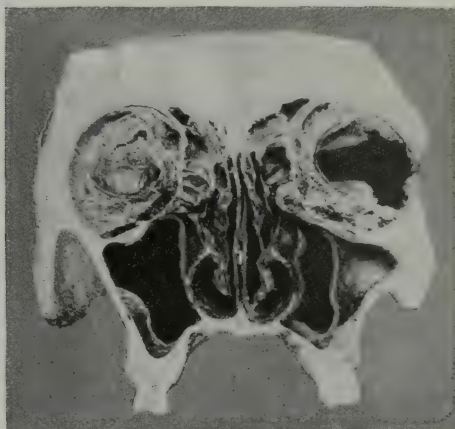


B

or plate are frequently distorted and are to be interpreted conservatively. A pathologic condition of the antrum may be revealed in the dental roentgenogram by an irregular line, or shadow, running above the roots of the teeth and frequently appearing to pass below their apices. (Fig. 1.)

As it is not apparent that the significance of this line has been satisfactorily determined, it may not be out of place to point out here that it may be caused by necrotic tissue. This theory is supported by the fact that teeth extracted in cases where this line is present, as revealed by the roentgen ray, occasionally have tufts of deep purple tissue, in vari-

FIG. 2.



the superior knowledge of the physician relative to general systemic conditions of the human body, and when they refer a patient to us who is suffering from indigestion, rheumatism, neuralgia, neuritis, facial eczema, Bright's disease, or other unexplainable bodily ailments, with the request that we make a thorough examination of the teeth to see if we can find an exciting cause or a point of focal infection, it is for us, as dental practitioners, to exhaust every resource at our command to be of service to the patient and merit the confidence of the physician. We do often find cause for trouble, such as impacted teeth, pulp nodules, exostoses, pulpitis, Riggs' disease, alveolar dental abscess and roots of teeth perforating the maxillary sinus or the antrum of Highmore. (Fig. 2.)



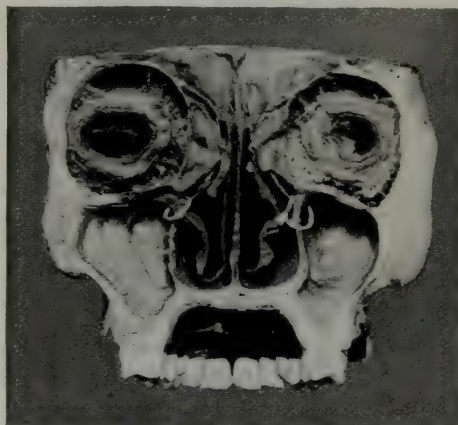
## ANATOMY OF THE ANTRUM.

This sinus, like other parts in facial anatomy, quoting freely from Professors Garretson and Cryer, is very rarely found in typical form. It may be found as early as the fifth or sixth month of fetal life, and its development is not completed until after the age of puberty. It is contained almost wholly within the superior maxillary bone and its processes. When it is approximately true to type it is of an irregular pyramidal shape with its apex bearing toward the malar bone, into which it may extend, and with its base toward the nasal cavity. Its mucous membrane is much less vascular than that of the nasal or of the oral cavity. The walls of this cavity sometimes support a thin septum, vertically inclined, which subdivides it into small compartments. It is somewhat larger in the male than in the female, and its capacity varies with different subjects, even in the opposite bones of the same subject, but the average is about three drams. It usually extends from the region over the distal surface of the second molar forward to the apex of the second bicuspid, but occasionally it is found sufficiently extended to cover the regions of both the third molar and the first bicuspid. This sinus opens into the meatus of the nose by an orifice of variable size situated at the base of the pyramid and upper part of the sinus and does not, unless the head is tipped forward, admit of ready outlet to fluids within its chamber.

We are more interested in the lower border of this cavity, the alveolar process and the teeth which it contains. This alveolar process, of cancellated bone, extends from the median line back to and including the tuberosity on either side, forming part of the floor of the antrum and containing sockets corresponding to the roots of the teeth. These sockets are lined with a periosteal tissue, which is periodontal membrane. This alveolar process, and in fact the whole floor of the maxillary sinus, appears to be thicker in the Negroes than it is in the Caucasians.

We are frequently called upon to treat disordered conditions of the antrum where its lower border is comparatively thin, caused by one or more roots of the teeth, in their development, having pushed up into the walls on the sides of the antrum (Fig. 3), or having lifted slightly a section of its floor. So long as there is a sufficient layer of healthy tissue covering these roots to insure, undisturbed, the function of the nerves and bloodvessels supplying the dental pulps the position of the roots will, if the teeth

FIG. 3.



are otherwise healthy, cause no discomfort; but if such teeth, by any abnormal condition already mentioned or by traumatism or malarticulation, or by being overtaxed in supporting a bridge, or overirritated by radical methods in regulating, should suffer by irritation the death of the whole or a part of their dental pulps, there might, and probably would be pain reflected to other parts, or an alveolar dental abscessed condition in the antrum, and the only method of effecting permanent relief is in a judicious use of the forceps.

After extraction the opening in the antrum which has been perforated should be freely curetted to remove all carious tissue, points and sharp edges of bone, care being exercised not to allow the instrument to do undue injury. Proper

drainage should be maintained and the antrum should be irrigated at least once each day with a non-irritating antiseptic solution until all evidence of irritation has disappeared; and then, only, should the opening be allowed to close. Peroxid of hydrogen should not be used in the maxillary sinus.

#### IRRIGATION OF THE ANTRUM.

Any method of irrigating by which the solution merely fills the antrum and is allowed to drain out is faulty. There should be a liberal flushing of the sinus

must be provided to keep it from closing. For this purpose a vulcanite rubber plug nearly one inch in length shaped somewhat like a large tack, the shaft of a size to fit snugly into the opening and with a wide shallow groove cut next to the head, will be found efficient. (Fig. 4.)

Fig. 5 shows a vulcanite plate and plug combined, and is another very efficient method of retaining the opening in the antrum. This appliance has been worn with perfect comfort since June 8, 1918. The antrum is entirely healthy, but as this case is rather a difficult one to adapt a plate to and as the plug appears to

FIG. 4.

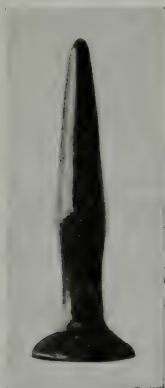


FIG. 5.



to remove all particles of detached tissue, pus, blood, and mucus.

For an irrigating appliance there appears to be nothing better than a four-ounce, hard-rubber rectal syringe to which is attached about eighteen inches of soft-rubber tubing, into the free end of which is securely fastened a hollow metal point of suitable size to admit of entering the opening. The point which comes in a chip blower or, if a smaller point is desired, one of those long points designed for the compressed air outfits may be used; both are very satisfactory. Usually the opening as made into the antrum, when extracting, will remain sufficiently large to admit of irrigation for a few days after the operation, but if it should be necessary to continue the process for any length of time means

assist very materially in holding it in position, there is no reason why it should be removed. The patient can remove the plate at will, and if she desires to irrigate the antrum she takes the solution in her mouth and forces it out through the nostril. When she wants to leave the plate out over night she puts in a plug as shown in Fig. 4 to keep the orifice open.

#### REPORT OF CASES.

It is hoped the record of the following cases may be of interest:

*Case I.* Mrs. G——, had been advised to spend the winter in Florida because of "tubercular throat." Under protest submitted to extraction of lower bicuspid which had necrotic root apex. Condition of throat greatly improved before half of journey was covered. Recovery complete.



*Case II.* Mr. B——, a hospital rheumatic patient about thirty, could not move from bed without assistance. Extracted nine teeth, most of them with necrotic apical membrane. Patient was able to walk about the ward in twelve days.

*Case III.* Miss M——, a rheumatic. Extracted three teeth which had diseased root membrane. Recovery prompt and complete.

*Case IV.* Mrs. A——, hospital patient about thirty-five and four months pregnant. Had severe neuralgia; upper teeth badly decayed. Patient was etherized and all upper teeth extracted. Result very satisfactory. No physical disturbance.

*Case V.* Mrs. C——, a rheumatic cripple. Came to office supported by two attendants. Extracted two upper third molars and four upper bicuspid; all with nodular pulps. Periodontal membrane appeared to be healthy. In six days patient went upstairs, unassisted, for the first time in many months.

*Case VI.* Mr. K——, about sixty-five, rheumatic, could walk only with great difficulty and much pain. Had a few loose teeth to which were attached bridges, of which he was very proud, and with which he parted quite reluctantly. Extracted, May 28, 1919. Condition very much improved and patient is able to work.

*Case VII.* Mrs. R——, a hospital patient, suffering from indigestion. Was wearing an extensive and splendidly made lot of crowns and bridges. Roentgenographic examination revealed necrotic condition of roots of nearly all of the teeth, of which condition she had not the slightest knowledge. All teeth, with the exception of three in lower jaw, were extracted. In three months the woman was a picture of health—says she is feeling better than she has for five years.

*Case VIII.* Mr. P——, a hospital patient in delicate health; sight of one eye had been destroyed, sight of the other eye was being rapidly lost. Teeth extremely loose with periodontal membrane necrotic. All upper teeth extracted, many of them almost slipped from the bone. No change for four days; improvement began at that period and continued for nearly one month when lower teeth were all extracted, they being in about the same condition as upper teeth. Recovery rather slow but fairly complete. Destruction of sight of eye arrested.

*Case IX.* Mr. T——, teeth loaded with crowns and bridges; was anemic; red blood corpuscles had dropped from a normal of 5,000,000 + per cc. to 1,500,000 per cc. All

the teeth in the upper jaw and many in the lower jaw were extracted Feb. 5, 1917. Convalescence slow; but red blood corpuscle count regained the normal and patient appears to be well.

*Case X.* Mr. R——, hospital patient, suffering with rheumatism and neuritis, could not walk, pain unendurable and controlled with narcotics. Roentgenographic examination revealed the presence of impacted right and left lower bicuspid. These were removed October 7, 1919. Convalescence rapid. At this date, October 17th, patient is able to walk comfortably about the ward and is entirely free from pain.

*Case XI.* Miss F——, had facial eczema and slight catarrhal condition. The four superior bicuspid were extracted and sockets curetted about fifteen years ago. All symptoms very soon disappeared and case has given no trouble since.

*Case XII.* Mr. H——, a diabetic for several years. His teeth had just been put in the best of order, but he soon returned from a specialist in urinary diseases, whom he had lately consulted, with the request that his teeth be given a thorough examination. He said his teeth were all perfectly comfortable. Roentgenographic examination revealed abscesses at the roots of lower molar and bicuspid. The roots of one upper molar appeared to be in antrum. The three teeth were extracted and opening into antrum curetted February 7, 1918. Two weeks later, to a day, patient returned with the information that he had just had an examination of the urine and no trace of sugar was found. Patient's general condition has remained greatly improved.

*Case XIII.* Miss W——, nurse at the hospital suffering with acute inflammatory rheumatism. Her hands and arms were badly swollen and swathed in gauze bandages; could be moved only on a stretcher. Had devitalized upper bicuspid. Roentgenographic examination showed line in antrum indicating perforation by molar which appeared, outwardly, to be perfectly sound. Both teeth were extracted and opening in antrum over molar was found large enough to admit handle of an excavator. This was curetted. No further treatment required. Patient rapidly recovered and soon returned to duty.

*Case XIV.* Miss L——, graduate nurse suffering from rheumatism. Roentgenographic examination revealed line in antrum over first molar indicating perforation. Molar had gold crown with bicuspid extension. Extracted



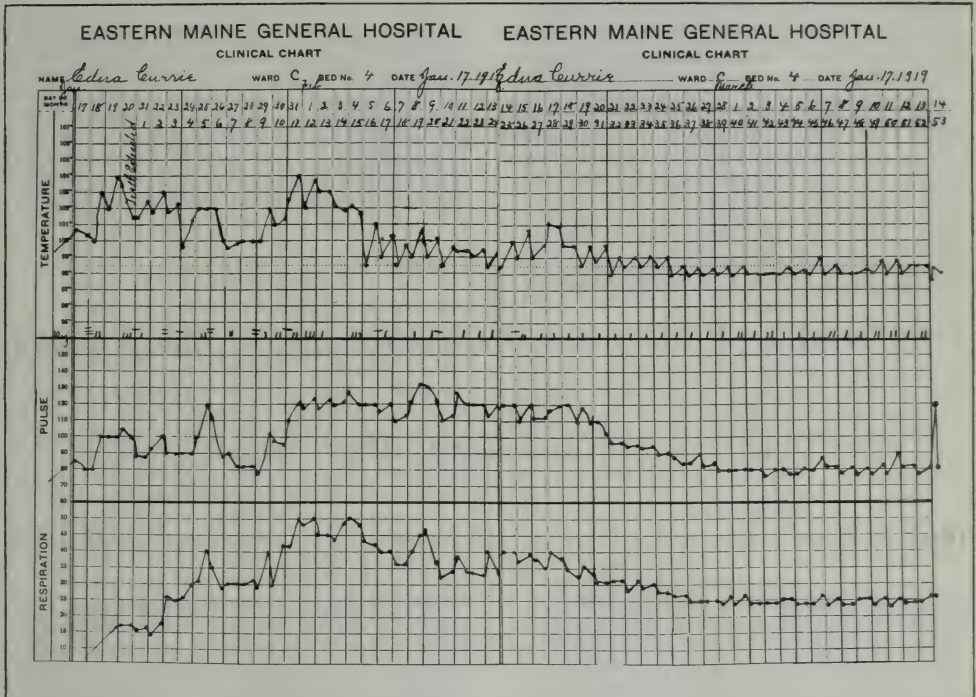
and curetted. Rheumatism entirely disappeared.

*Case XV.* Miss E——, excruciating pain in right ear. Had previously submitted to mastoid operation without desired result. Roentgenogram displayed line in antrum indicating perforation over right molar and bicuspid. Both teeth were extracted and sockets curetted. Recovery complete.

tracted and antrum curetted. Very marked improvement. Patient was able to return to her home, some distance away, in two weeks.

*Case XVIII.* Mr. G——, suffering badly from iritis. Was referred to operator by oculist. Patient had lost several upper teeth. Roentgenogram displayed line in antrum indicating perforations by molar roots on both sides. These very sound and strong molars,

FIG. 6.



*Case XVI.* Mrs. F——, a rheumatic. Teeth appeared to be in good condition on casual examination. Roentgenogram displayed line in antrum indicating perforation by first and second molars and second bicuspid on each side, and abscessed condition of both superior central incisors. The eight teeth were extracted and large perforations found in both antrums which were curetted. One bicuspid did not perforate the antrum, but root of this tooth and roots of the two centrals were in necrotic condition with denuded apices. Recovery complete.

*Case XVII.* Miss W——, hospital patient, about twenty. Confined to bed with general depression, was wearing partial upper denture. Remaining upper teeth were ex-

as well as few remaining upper teeth, were extracted. Large perforations in both antrums over molars found and curetted. Two months later patient wired operator that he was "feeling fine."

*Case XIX.* Mrs. C——, suffering from excruciating facial neuralgia. Roentgenographic examination indicated perforation of antrum by two superior molars and bicuspid. Patient was not aware these teeth were troubling her. The three teeth were extracted and large opening in antrum curetted. Pain promptly disappeared.

*Case XX.* Mrs. B——, had no knowledge that teeth were diseased. Was troubled greatly by several superficial abscesses on face over region of antrum. Roentgenographic ex-

amination indicated perforation of antrum by roots of two molars and a bicuspid. These three teeth were extracted, perforations in antrum found as indicated and curetted. Abscesses healed rapidly and skin resumed normal condition.

*Case XXI.* Mrs. C——, troubled with catarrh for years which at times had been very severe. Neuritis in right arm at times prevented her raising it from side. Roentgenographic examination indicated perforation of antrum by second bicuspid and two remaining molars on each side, also by apex of left cuspid, which was unerupted and lay in contact with apices of left central and lateral incisor roots. All the upper teeth, including left cuspid, were extracted and openings in antrum curetted. Apices of both centrals and laterals were eroded. Irrigating solution when passed into left antrum came out from both

nostrils and from opening in antrum on right side. Recovery slow but complete.

*Case XXII.* Miss C——, about twenty-six, nurse at hospital and a splendidly healthy-looking young woman. Developed abscess over perfectly sound and normal appearing right superior lateral incisor, which on being opened discharged quantities of very bad-smelling pus; at which time history of case began. On evening of second day temperature was 104 degrees, case looking decidedly critical. Roentgenographic examination revealed perforations in antrums by roots of first and second molars on right side and first molar on left. Accepting competent advice these three molars and the lateral incisor were extracted. Patient developed pericarditis and endocarditis as a result of general infection. Recovery very slow and incomplete. (See chart, Fig. 6.)

## The Overbite Problem in the Treatment of Malocclusion.

By ROBERT H. W. STRANG, M.D., D.D.S., Bridgeport, Conn.

(Read before the twelfth session of the Alumni Society of the Angle School of Orthodontia, at Chicago, July 14, 15, and 16, 1919.)

THAT variation from normal occlusion which we term excessive overbite has been an extremely interesting subject to the writer and its importance in relation to the treatment, the retention, and the final result of any case in which it is a complicating symptom, cannot be too greatly emphasized. Many articles have been written on this problem, but these center themselves about the various appliances suggested for its correction and make little analysis of the defect itself. While the subject is mentioned in the various textbooks on orthodontia, yet even there it is superficially dealt with, and experience has demonstrated that it is too vital a problem to dismiss with a passing thought. Therefore, a study of the subject seems warranted at this time.

First, what do we mean by "excessive overbite"? The term is used to designate a condition wherein the incisor teeth exhibit too great an overlap. The lower incisors are striking the upper in a position too far rootward or may have lost complete contact with the upper incisors and are resting on the soft structures covering the roof of the mouth. (Fig. 1.)

What may this be due to? Such a symptom would be caused by:

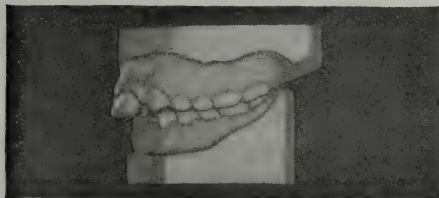
1. Failure in the vertical development of either the lower or upper molars and bicuspid or of all of these, thus allowing the mandible to close too far.
2. Hyper-vertical development of the lower incisors.
3. Hyper-vertical development of the upper incisors.



4. A combination of any of the above three conditions.

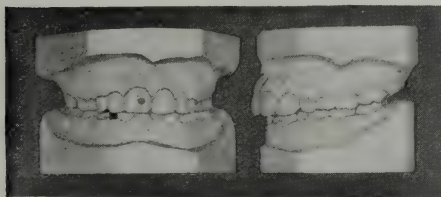
There seems to be somewhat of a diversity of opinion among writers as to which of these conditions is the active factor. There was a time when it seemed to the writer that this symptom was in all cases due to a lack of vertical development in the molar and bicuspid region.

FIG. 1.



However, the difference in the response to treatment and the action of certain cases during the retention period has led to a decided modification of this viewpoint. I now feel certain that there are cases in which each of these factors are individually active and that there are some cases also in which more than one of these errors has combined to influence the bite.

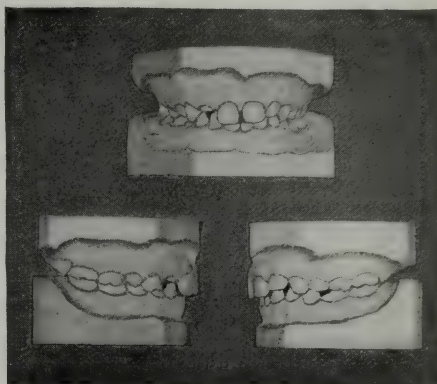
FIG. 2.



A careful study has been made to see if it was possible to locate the area of maldevelopment in a given case so that one might have a key to the proper mode of treatment. Certain conclusions have been reached which will be presented to you for further investigation. They are as follows: *First:* In Class I cases complicated by an excessive overbite, the condition is due to a supra-occlusion of the incisors, usually both upper and lower. (Fig. 2.) A few cases are found in

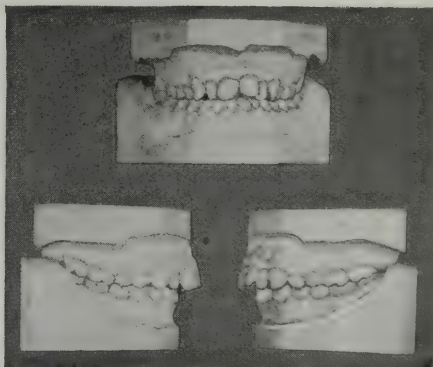
which there is also an infra-occlusion in the distal part of the arches, but these are rare. (Fig. 3.) *Second:* In Class II, Division 1 cases, the area of maldevelopment is almost invariably in the

FIG. 3.



molar and bicuspid region and consists of an infra-occlusion of these teeth. (Fig. 4.) *Third:* In Class II, Division 2 cases, there is a combination of the two factors. Primarily, the error is that of

FIG. 4.



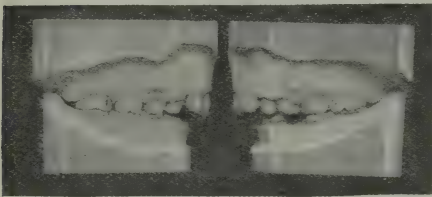
infra-occlusion in the molar and bicuspid region and secondarily, a supra-occlusion of the incisors develops. (Fig. 5.)

The etiology of this failure in development or of this hyper-development has never been explained. Why an arch



should exhibit a splendid forward and lateral growth as some of these cases do and yet fail so markedly in the vertical dimension is hard to understand. That different internal controls are at work and govern these three developmental lines and that one of them fails to do its part is a pretty theory but without foundation. However, we do know that the force of occlusion in mastication is tremendous. Is it not feasible to suggest, therefore, that a weakened osseous development would be retarded in that area and direction where the greatest force was exerted against it, and thus the masticating teeth, which feel this force, would be prevented from reaching

FIG. 5.



the line of occlusion while the lateral and forward growth of the arch would be carried on more normally because of the muscular balance of the tongue, the cheeks and the lips? This would account for the failure in vertical growth in the molar and pre-molar region associated with more or less perfect development in the other two directions and is a more reasonable explanation, I believe, than that of an internal hormone control. Certainly this field, offers a splendid opportunity for interesting and necessary research work.

The supra-development of the incisors may be explained in the following manner. In practically all cases, both in Class I and Class II, Division 2, in which we see this symptom there is also a failure in forward development in the incisor region as demonstrated by lack of room for the permanent cuspids or by the lingual slant of the incisors. Nature has met with muscular resistance that she has been unable to overcome. This

forward developing force under the influence of a greater resistance than it can overpower becomes perverted into a supra-developing force, and the incisors with the alveolar process are carried beyond the line of occlusion to a position of supra-occlusion. In practically all cases in which we see incisors, either upper or lower, forced into a lingual position, we will find them exhibiting a tendency to pass beyond the line of occlusion and assuming a position of supra-occlusion. Therefore, there are a few cases in Class II, Division 1, which have incisors, usually the lower, in supra-occlusion.

*This determination of the area of faulty development in a given case is an exceedingly important factor, for upon such deduction depends the successful treatment and the permanency of the final result.*

#### EXCESSIVE OVERBITE AN ETIOLOGICAL FACTOR IN ARCH MALFORMATION.

When an excessive overbite has been established it in turn becomes an etiological factor in the development of future arch malformation. Especially is this true if it manifests itself in the deciduous arches. This fact was suggested by the writer in a short paper published in the *American Orthodontist*, October 1911, vol. iii, No. 2, entitled "A Contribution to the Etiology of Cases in Class II, Division 2." Quoted from this article is the following paragraph:

With this abnormal overlapping in the incisor and cuspid region in the deciduous arches, we find six inclines pre-eminently and unnaturally active. These are formed by the lingual surfaces of the upper incisors and cuspids and the labial surfaces of the lower incisors and cuspids. In this abnormal position they at once become the longest, the most powerful, and, therefore, the most positive of all the inclines in action at this age. The difference in width of these upper teeth at the cutting edge and at the gingival margin is approximately  $\frac{3}{32}$  of an inch. With every closure of the jaw we find the lower teeth sliding up these powerful inclines, and what is the result? One of three conditions must

arise or a combination of two or all of them: (1) Either the upper incisors must be carried labially; (2) the lower incisors must be carried lingually; (3) or the mandible must be forced distally.

If, therefore, this condition is not only a symptom of malocclusion but can also of itself cause malocclusion, how much more necessary it is that our treatment should take this into consideration and absolutely eliminate it as a complicating factor. One cannot emphasize this too strongly and, I believe, that the secret of successful treatment in all such cases lies in overcoming the overbite, and the permanency of the final result depends upon the complete mastering of this defect. Yet, in spite of all this, comparatively little attention has been paid to this problem, and case after case has been considered by orthodontists as completed when this symptom still remained to later cause more or less of a failure when the retainers were removed.

#### THE FIRST LOGICAL STEP WHEN PLANNING TREATMENT.

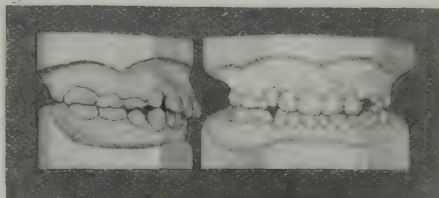
In considering the treatment of overbite cases the first logical step is to locate the area in the arch that is at fault in order that the proper appliance may be adjusted to correct this. Formerly it was my custom to place a bite plate in all of these cases and trust that the result would be satisfactory. Some cases progressed splendidly and remained permanently successful. Others behaved differently and were more or less of a failure. I did not understand why this was until Dr. Angle called my attention to the fact that the ribbon arch was very effective in overbite cases. I then tried the ribbon arch, to the exclusion of the bite plate, and I obtained splendid results in certain cases and failures in others, but when I studied my cases I found the good results and the failures with the two appliances were in different types of malocclusion. The bite plate effectively developed Class II, Division 1 cases, which were of the infra-occlusion type and gave a permanent result, but was a failure in the Class I, or supra-

occlusion cases, while the ribbon arch was not successful in the infra-occlusion group but very effective in the supra-occlusion type. Some cases were also found in which both appliances seemed necessary to accomplish the end desired. Thus, it was this experience of the difference in the behavior of cases under treatment that led to the analysis of the area at fault, the character of the mal-development and the grouping of cases as suggested in a previous paragraph.

#### THE TREATMENT OF CLASS I CASES.

Little is found in either textbooks or essays concerning cases in Class I exhibiting this complication, yet it is far from uncommon. Many such malocclu-

FIG. 6.



sions are practically untreatable until this defect has been overcome, when the case simplifies itself to a remarkable degree and the end-result is readily attained. On the other hand, if this factor is overlooked and an attempt is made to force the teeth into alignment against the resisting power of these tremendous inclined planes, failure is bound to result and normal occlusion as a permanent end-product is impossible. The case illustrated in Fig. 6 came to me with a history of having been treated for over a year with the result as shown. The operator, failing to take into consideration the overbite and in his effort to correct the incisors which were too prominent, was attempting to force them distally against a most resistant obstacle, *i.e.*, the whole lower arch. When the bite was opened the case simplified itself immediately.

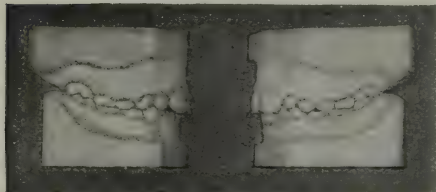
The following case illustrates one of



my own mistakes that led to more careful investigation. Fig. 2 is a typical Class I malocclusion complicated by excessive overbite. This case was treated several years ago and a bite plate was used. With this appliance the bite was opened temporarily, which permitted the movement of the lower incisors into

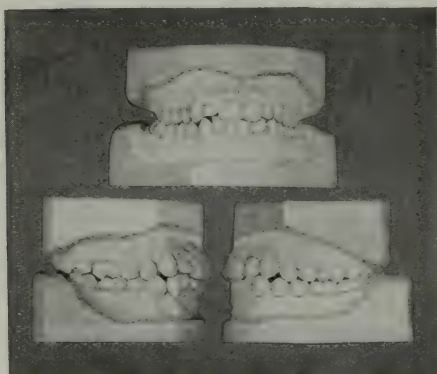
as near like that in Fig. 2 as any I have in my collection, is under treatment at the present time and no bite plate has been used, but the upper and lower incisors are being depressed with the ribbon arch and the case is responding beauti-

FIG. 7.



alignment so that the result was apparently successful. When the plate was removed, however, the molars began to settle because, as I now believe, they had been elongated to a position beyond the line of occlusion and nature would not retain this abnormal artificial position

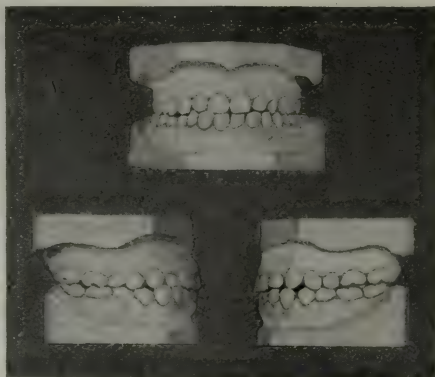
FIG. 8.



against the force of mastication. With the closure of the bite the jumbling of the lower incisors necessarily recurred. Had this condition been recognized as a supra-occlusion of the incisors and these teeth depressed, a different story, I believe, could be told.

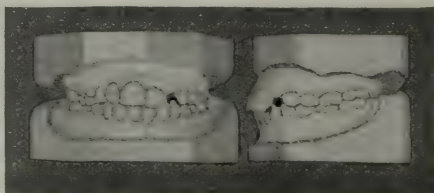
The case illustrated in Fig. 7, which is

FIG. 9.



fully. The end-result will, I firmly believe, justify the change in the plan of treatment, and right here I wish to give credit to the "ribbon arch" appliance as the most positive of all appliances for the depressing of teeth in their sockets. That it will do this I have abundant

FIG. 10.



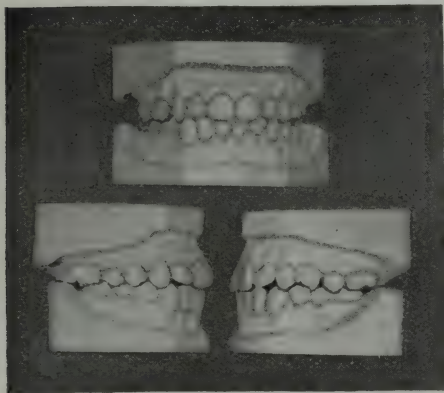
proof and I know of no other mechanism that will accomplish this, the hardest of tooth movements, so easily and effectively.

Fig. 8, illustrates another similar case. At first glance all that seemed necessary was a widening of both arches, but when careful study was made it was observed that the lower incisors were not only held in malposition by lack of width but



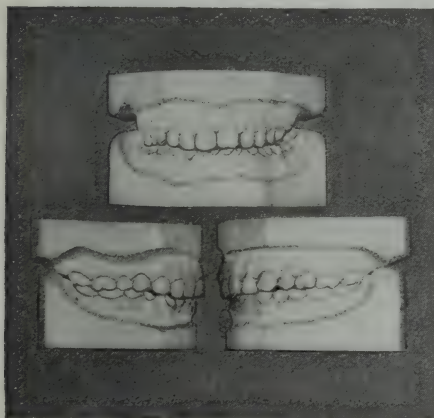
also by the supra-occlusion of the incisors. It was, therefore, mechanically impossible to treat this condition without overcoming the overbite. This was ac-

FIG. 11.



complished with the ribbon arch and the result is shown in Fig. 9. These models were taken at the time retention was applied, which was in March 1918. In February 1919 the upper retainer was

FIG. 12.

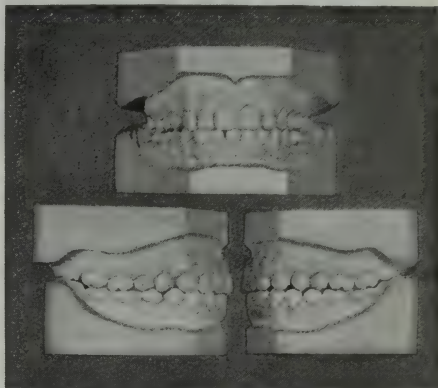


removed *in toto* and the lower a month later, leaving a cuspid to cuspid lingual wire. To date there has been no tendency for the overbite symptom to recur.

Another Class I case is shown in Fig. 10. How impossible it would be in this

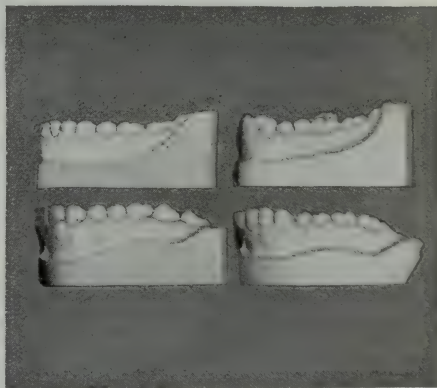
malocclusion to carry the lower incisors forward to make room for the permanent cuspids and to bring the roots of the upper incisors to a correct position without first overcoming the overbite. This case was started four years ago and a

FIG. 13.



bite plate was used. The result was not successful, for when the plate was discontinued the overbite reappeared. When the ribbon arch was introduced by Dr. Angle, this appliance was applied to the

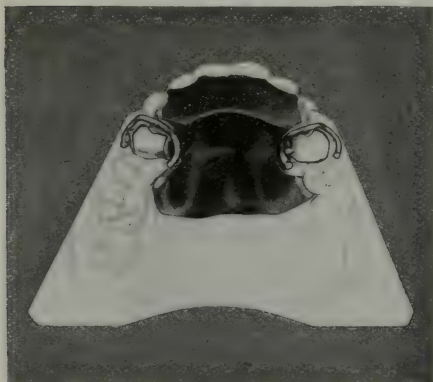
FIG. 14.



case and the incisors depressed. It was one of the first cases in which this tooth movement was attempted by the writer, and I wish to call your attention to the mistake that was made. All of the in-

cisors were attacked *en masse* and while they were depressed, yet a distal tipping

FIG. 15.

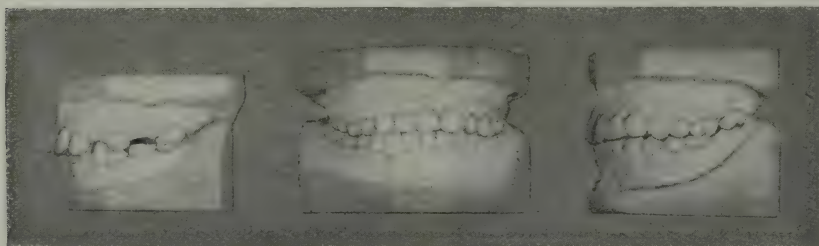


of the molars was the result. (Fig. 11.) This was faulty treatment and poor

one to its final position, however, before passing to another. A partial movement is to be accomplished and then the tooth given a rest while another is depressed to a corresponding level. After all have been equally acted upon the operator can start again on the original tooth. In this way the anchorage is not strained and no inflammatory reaction appears at the point of tooth movement.

Fig. 12 illustrates still another case in Class I. Here a bite plate was used in conjunction with the ribbon arch but not for the purpose of developing the molars and bicuspsids. As you will note from the models, it was impossible to place the appliances on the lower arch because of the bite. The introduction of the bite plate overcame this difficulty and allowed the operator to adjust the ribbon arch, after which the case was treated by depressing the incisors. The result is shown in Fig. 13. A view of the

FIG. 16.



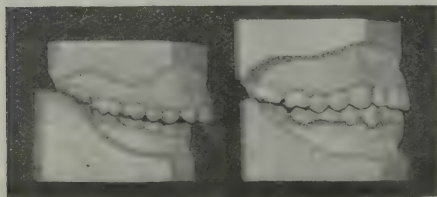
A

B

C

mechanical judgment and should be condemned. One or two teeth at the most

FIG. 17.



A

B

should be depressed at a time. The operator should not try to carry each

occlusal planes, Fig. 14, shows very clearly that the incisors have been depressed. This case is still under retention, but parts of the appliance have been removed and there has been no tendency for the overbite to re-appear.

I am sorry that I cannot show models of any Class I cases, treated by depressing the incisors, several years after all appliances have been removed, so that the real end-results can be demonstrated. This I cannot do because we have not had the ribbon arch for a sufficiently long period. However, the marked difference in the behavior during the retention period of cases so treated as compared with similar ones treated with the bite

plate makes me believe that we are much nearer the correct solution of this symp-

tom in Class I than ever before. I hope to report these cases in later years as truly successful.

FIG. 18.

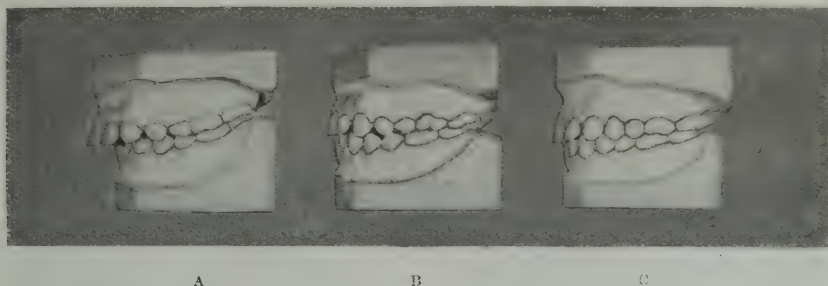
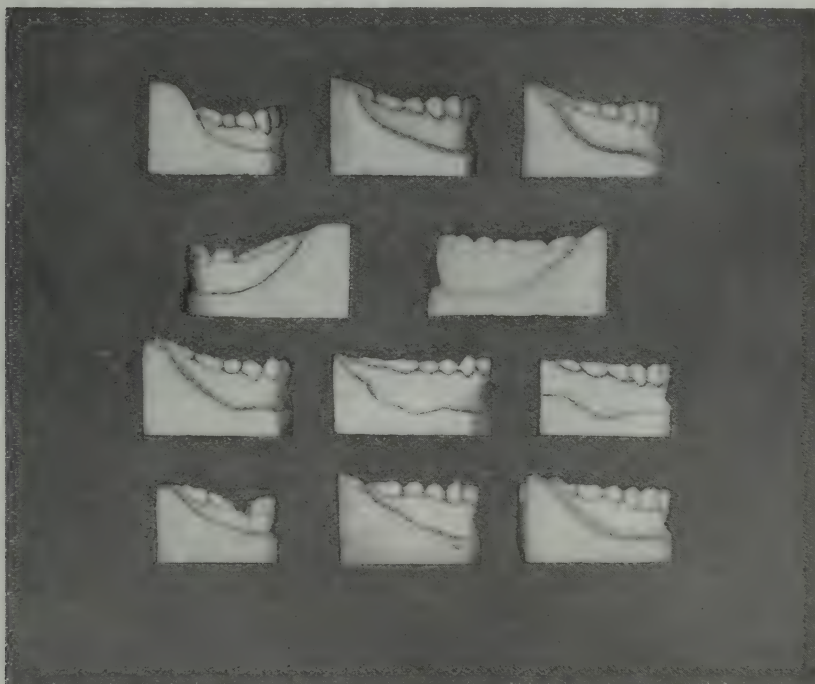


Fig. 15, pre-eminently successful. This is so because we are dealing with a different mal-development. Here the area

FIG. 19.



#### THE TREATMENT OF CLASS II CASES.

In Class II, Division 1, cases exhibiting this complication, and most all of

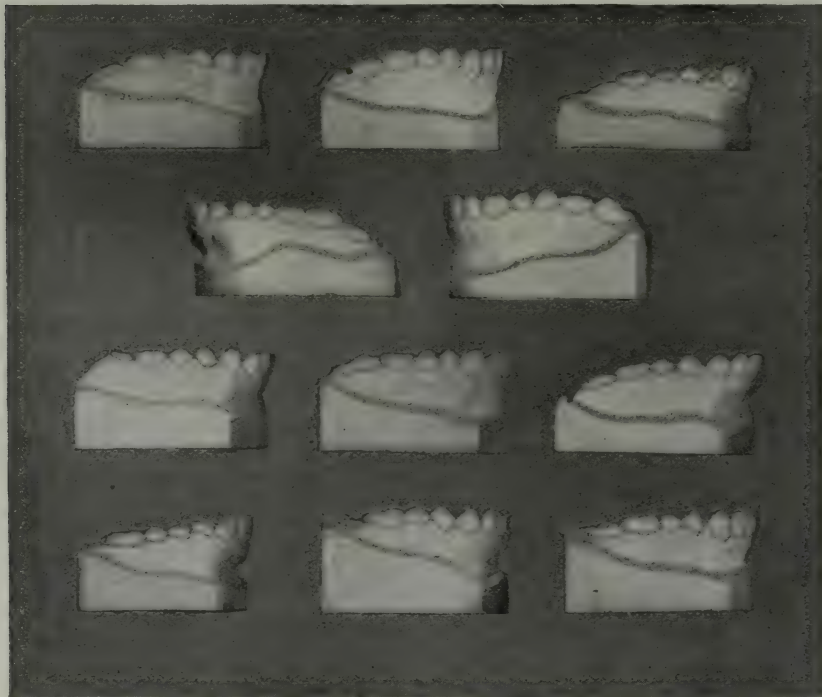
at fault is in the molar and bicuspid region and consists of an infra-occlusion. The bite plate, by relieving all pressure from these teeth, permits nature to com-



plete their eruption. This she should be allowed to do unaided by "up and down" intermaxillary elastic force as has been suggested by some writers. Such force accomplishes the movement too quickly to be physiological and the bone development is not nearly as satisfactory or permanent. In connection with the bite plate I use the ribbon arch

This clasping of the bite plate in position was suggested by the writer several years ago and overcomes very nicely the problems confronted by the suction plate. It is firm, yet can be removed for cleansing. So fixed is it, when snapped into position, that the patient is unconscious of its presence. This stability is one of the secrets of its success, for when the

FIG. 20.



(The models on the first and third lines should be read from right to left.)

appliances on the lower teeth to make as fixed an anchorage as possible for the ordinary intermaxillary force used in these cases, and the "E" arch on the upper teeth with hooks for the elastics. The bite plate is worn steadily for at least one year and then part time either night or day until it is gradually dispensed with. The plane should be made on a level with the incisor teeth. The teeth selected for the bands carrying the lugs accommodating the clasps of the plate, are the first bicuspid, if present. When they have not erupted the second deciduous molars are used.

incisors strike against it, they meet with a firm hard resistance and the bite remains open until the molars and second bicuspid complete their eruption. A bite plate that is not fixed is worse than useless, for the incisors simply push it backward and then the molars are in contact in their old position. Tooth movement is carried on exclusive of the teeth to which the plate is attached, and these two teeth are later carried to their correct position when the plate is removed. At times the first bicuspid may primarily be moved buccally or rotated and then the bite plate adjusted to them

acting as a retainer for these teeth while the molars are elongating.

Fig. 16A illustrates a case treated with this appliance. B is the model taken at the time of retention and C is a model of the case taken eight years after all appliances had been removed.

Fig. 17A is another such case; B is a model taken three years after all appliances had been removed.

Fig. 18A is a typical case. Model B was taken at the time of retention, and model C four years later.

A study of the mandibular arches, Fig. 19, before and after treatment, in these cases of infra-occlusion brings out some interesting features. Before treatment there is a characteristic and exaggerated curve in the occlusal line caused by the dipping down of the bicuspid or deciduous molars and the tipping forward of the first molar. The second molar, if in place, is always on a much higher plane.

After treatment it will be noted that this curve has been eliminated to a great degree. The first molar has erupted to a level with the second molar and in most cases seems to have assumed more of an upright position. The position of the incisors is interesting. Some authors have advocated the use of the bite plate for depressing the incisors. That their results were negative I believe is clearly shown in these cases, for what they were obtaining was a growth of the molars and bicuspid and in some cases even a continued eruption of the incisors, as shown by their occlusal level in comparison with the second molar which is taken as a standard for comparison, for I believe it is little changed during the process. That there is a considerable general development throughout the entire body of the mandible I believe is clearly shown.

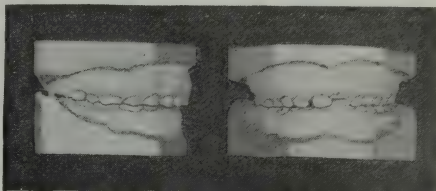
The maxillary arches, Fig. 20, are markedly changed in the molar and bicuspid region showing a great deal of vertical development.

Although my experience in Class II, Division 2, cases has been somewhat limited, yet I feel certain that we are dealing with a combination of infra-

occlusion in the molar and bicuspid region and supra-occlusion in the incisor area.

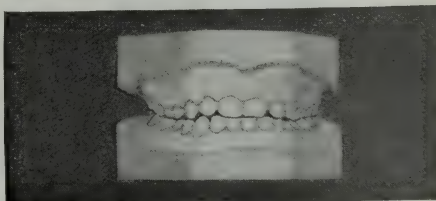
The case illustrated in Fig. 21, which is in Class II, Division 2, has given me one of the hardest fights that I have experienced since I began to specialize, therefore, its history is of interest. Treatment was begun the latter part of

Fig. 21.



1909 and to overcome the overbite, gold crowns were placed on the lower second deciduous molars. These were useless, for the teeth were soon driven into their sockets. In 1911 a bite plane was soldered to bands on the incisors having a lingual wire attached to the molars. This partially opened the bite, but after the removal of this appliance there was a recurrence. In 1916 a bite plate was

Fig. 22.



first used. During all of this time the distal occlusion of the mandible was most marked and it seemed impossible to overcome either this symptom or the closed bite. With the insertion of the bite plate there was a decided improvement in the latter symptom. A respiratory shield as suggested by Dr. Johnston was then tried faithfully by the patient but accomplished little. In 1917 the ribbon arch was applied to the upper teeth and the

FIG. 23.



A



B

FIG. 24.



A

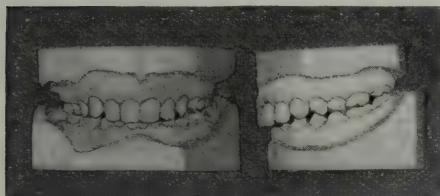


B



incisors were depressed. At the same time a bite plate was used together with heavy intermaxillary force. Much to my surprise the case responded at last and I was able to retain it in March 1918 in the position as shown in Fig. 22. In

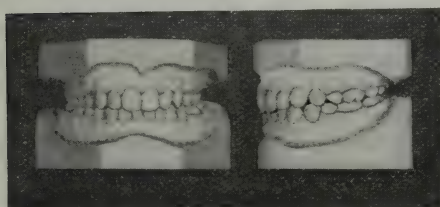
FIG. 25.



May of this year all appliances were removed and I believe the result will be permanent. If so, it was worth the struggle, as the photographs of the case demonstrate. Figs. 23 and 24.

While not a typical Division 2 case, Fig. 25 is on the borderline between

FIG. 26.

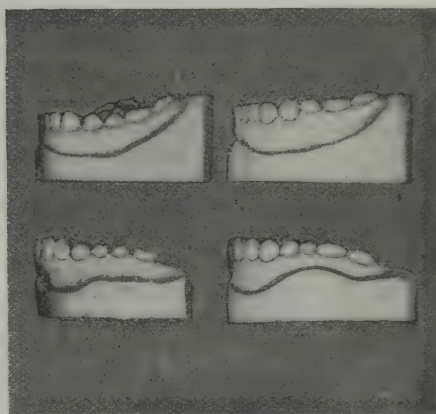


Divisions 1 and 2. These cases are not uncommon. This was treated with a bite plate, with the result as shown in Fig. 26. A view of the occlusal planes is seen in Fig. 27. The incisors in this case had not been forced lingually and, therefore, were not elongated, consequently, the treatment was successful without depressing them.

In conclusion I would summarize the following facts:

1. Excessive overbite as a symptom of malocclusion is a common complication and is frequently neglected in treatment.
2. When found in Class I cases it is due to a supra-occlusion of the incisor teeth and successful treatment demands the depressing of these teeth.
3. In Class II, Division 1 cases, it is due to an infra-occlusion of the molars

FIG. 27.



and bicuspid and their eruption to normal is required.

4. In Class II, Division 2, there are both supra-occlusion of the incisors and infra-occlusion of the masticating teeth and a combined treatment is indicated.

5. When an excessive overbite has been established it becomes an active factor in causing future maldevelopment.

6. Permanent end-results in the treatment of these cases can be only obtained by eliminating the overbite through proper treatment of the arch area involved.

FIRST NAT'L BANK BLDG.

# Histo-pathology of the Jaws and Apical Dental Tissues.

No. VII:

## The So-called Nasmyth's Membrane.

By EUGENE S. TALBOT, M.D., D.D.S., Chicago, Ill.

THERE is no subject in dentistry upon which so little research work has been done as upon the so-called Nasmyth's membrane. Those textbooks which pretend to treat the subject have nothing new to offer from that recorded thirty years ago, and most of them omit the subject from consideration altogether. Tomes<sup>(1)</sup> in his early work in 1894 has more to say than any other author, but since that time nothing new has been added to the subject by way of research. Most of the later writers will state that they do not believe there is such a membrane in existence.

Nasmyth, who first called attention to this structure and from whom it is named, regarded it as a "persistent dental capsule." Other early writers called it "enamel cuticle," and Tomes stated "that this structure is found upon the crowns of human as well as other mammalian teeth, the crown of which is coated by a thick layer of cement." Professor Huxley believed he had found it upon the teeth of still lower vertebrates, the frog, for instance.

Tomes, Magitot, and Wedl believed that this structure is continuous with, and similar to, cementum, it being a continuation of the same at the neck of the tooth. They also believed with Kolliker and Huxley that in some manner it is a product of the epithelium.

Waldeyer and Rose hold that Nasmyth's membrane is a product of a part of the enamel organ. After the completion of the formation of the enamel, they believe that the cells of the external epi-

thelium of the enamel organ become applied to the surface of the enamel and there cornified; in this way they account for its resistance to reagents, and for its peculiar smell when it is burned. Other writers believe just the opposite "that the membrane is composed of used-up cells from the external *stratum intermedium*, and of what remains of the ends of the enamel-forming cells after full calcification of the enamel."

All writers upon this subject state that this membrane can readily be found when treated by acids; even strong nitric or hydrochloric acids do not destroy the structures. This has been my experience, if not treated for too long a period. It is not so hard as enamel and is very indestructible. It is horn-like in structure. All these theories have been questioned by other investigators.

The method of research and the poor equipment for its study in those early days and the fact that only one or perhaps a part of a tooth was used for microscopic study narrowed the line of vision. For this reason even these gifted scientists were unable to agree upon certain questions, each looking at the subject from a different angle, all positive in regard to their own views and attempting to disprove those expressed by others. Tomes<sup>(1)</sup> sums up the views of each author, but mystifies rather than harmonizes the views expressed by each. This reasoning has no doubt had much

<sup>1</sup> Tomes: "Dental Anatomy," fourth edition, p. 92.



to do with the skepticism which has caused many of our later observers to state that they "do not believe there is such a thing as Nasmyth's membrane," and hence some authors have dropped the subject from their textbooks.

The statement of Magitot that "the external epithelium of the enamel organ is atrophied before the time of the completion of the enamel," and Tomes' addition, "a fact which if confirmed is fatal to Waldeyer's explanation," is almost fatal to all the theories advanced at this period.

Waldeyer and Rose were unable to demonstrate the correctness of their theories.

Strange as it may seem, there is a certain amount of truth in all the theories advanced by these scientists while there is no harmony in thought between them.

The first and largest stumbling-block in the way to a solution of this question is the statement made by Magitot, that "the external epithelium of the enamel organ is atrophied before the time of the completion of the enamel." This statement has been and is even now being taken for granted and is taught in our dental schools without confirming or rejecting it by aid of research. My own researches show, and I have demonstrated by nearly every picture in this series of papers, that the external epithelial layer remains in most cases until the tooth erupts and the crown passes through it and the sac wall.

The next statement of importance is that of Tomes in which he says, "The evidence offered that Nasmyth's membrane is cementum, although strong, does not amount to absolute proof."

While Nasmyth's membrane is not cementum, it seems to be an arrest of development bordering on that tissue.

It is generally understood and I have shown that the peridental membrane is the modified tissue of the sac wall or dental follicle; that where cement substance is needed this tissue becomes specialized, thus for instance, on the root of the tooth. It is not needed, however, upon the normal crowns of the carnivora

or human teeth. If, however, we descend in the scale of vertebrate types to the herbivora, we find that cement is necessary for the purpose of holding the enamel and dentin in place. Hence, we have a layer of enamel, a layer of cement, a layer of dentin, and so on throughout the surface of the molar tooth. The same membrane which lines the root is located over the crown, which specializes at that particular locality to form cement when and where needed. There is quite a space between the neck of the tooth (edge of the cementum) and the grinding surface of the crown in which cement is not required. The inner surface of the sac wall throughout is capable of undergoing a change in specialization, not so far as to produce lacunal cells, because they are not required, but a semi-calcification occurs which is cornified. This cornification is very common in the development of teeth in the herbivora, less so in the carnivora and is occasionally seen in the human. This semi-calcified tissue resists nitric or hydrochloric acid and is very tough and indestructible. This tissue, therefore, is continuous with the cement on the root and may and often does extend on the inner border of the fibrous sac wall, throughout the crown of the tooth. It cannot then be regarded as "a thin covering of cementum," as suggested by Tomes, Magitot and others, since the tissue has not arrived at that stage of development, shown by the fact that lacunæ are not yet present and complete calcification has not taken place.

Tomes again says: "The general absence of lacunæ in Nasmyth's membrane is due to the fact that it is not thick enough to contain them: just as the thinnest layers of unquestionable cementum also are without lacunæ."

The fact of the matter is that the sac wall remains thick or thin according to whether it originally developed large or small, and whether it has been stretched or not by the pressure of the crown forced upward or downward in the sac by the developing root, as I have shown in previous papers. If there are no depressions upon the crown, the membrane



remains in its thin normal thickness and simply undergoes its specialization as far as the cornification (a semi-calcification). The further development to normal cement is not required. In other words, complete specialization is not necessary because there are no cavities or depressions to fill.

Since the function of the entire inner surface of the sac is to specialize, the tendency is always in that direction. The extent to which it occurs depends upon the condition of the enamel and root of the tooth.

Under special conditions, namely, the development of degenerate tooth structures, the organ may become active and cement may be deposited on these abnormal surfaces, as well as in pits. In the carnivora and human, where the development of cement substance on the crown is not required, the external epithelial layer and the peridental membrane atrophy, not, as Magitot states, "before the time of completion of the enamel," but after the enamel organ has completed its work and the tooth is about to erupt. Indeed the atrophied or undeveloped cement tissue often remains throughout life. One of the most remarkable points to be considered in connection with this paper is the readiness with which the fibrous sac, finally the peridental membrane, will fill cavities and spaces not only in the crown but also between and around the roots of the teeth.

The peridental membrane is not unlike a mother protecting her young from disaster. In a normal state these structures fill in all spaces between enamel and dentin on the crown of the herbivora and increase the thickness at the end of the root in lower vertebrates. Like all atavistic developments, it naturally supplies deficiencies by depositing cement in abnormally developed human structures.

It is not uncommon to find in malformed (degenerate) human teeth folds of enamel and dentin intermingled with cement substance containing lacunæ, similar to those in a normal state in lower vertebrates. There are never two cases exactly alike, but the change in

location and shape from normal human teeth shows that they are atavistic in their development.

Such a tooth may be seen in Fig. 9; Carl Wedl's "Atlas to Pathology of the Teeth." The cement passes into well-marked coronal clefts. The tooth was a monstrous molar in the upper jaw removed from a country woman in 1824. There are three roots, two buccal and one palatal. The cementum of the roots passed without interruption over the crown, covering the latter in its whole circumference. The enamel begins at the neck of the tooth and runs along the crown toward the masticating surface. It does not reach it, however, because of the cementum which covers it. The dentin is inserted between the folds of the enamel in the form of wedges. Normal dentin is only found in small spaces just above the pulp chamber.

Another picture, Fig. 31, in the same book shows the cementum firmly attached to the folds of the enamel. This picture reminds one of the cementum overcasting the enamel of the molar teeth of animals.

Tomes<sup>(2)</sup> says: "Now and then an encapsulated lacuna may be found occupying a shallow depression in the enamel which it just fits, but more commonly a dozen or more are crowded together in a pit in the enamel, where they are usually stained a brownish color. The occurrence of lacunæ in these situations is far from rare; my father's collection contains more than a dozen good examples of them in these positions.

"Nasmyth's membrane, thin though it is over the exterior of the enamel, is thickened when it covers a pit or fissure, and when isolated by an acid, is seen to have entirely filled up such spots.

"In these places, then, where the encapsulated lacunæ are to be found, Nasmyth's membrane also exists, a fact which alone would lend some probability to the view that it is cementum."

The Tomeses have been very fortunate in finding so many deformed human

<sup>2</sup> Tomes: "Dental Anatomy," fourth edition, p. 89.

teeth with pits and fissures in the crown. I am of the opinion that if one interested in this subject were to hunt for deformed teeth with malformed enamel, the pericemental tissue including lacunæ would be seen in most of the specimens, especially deformed third molars.

In a general way, therefore, in the evolution of the teeth from the lower to the higher vertebrates, the specialization of the sac wall into first, the peridental membrane, and second, a cement-producing organ, depends upon the character of the tooth to be produced. For the molar tooth of the herbivora, in which the crown is composed of layers of dentin, cementum, and enamel, the entire inner surface of the sac wall is required. In carnivora and human teeth, where cement is not required for the crown, then atrophy of the internal surface of that part of the sac wall above the neck of the tooth takes place. When, however, deformities occur in the crown and enamel of the teeth of the carnivora and human, then atavistic tendencies occur, and the surface of the sac wall becomes peridental membrane and then specializes into a cement-producing organ for the purpose of filling in deficiencies.

The reason why the herbivora are the best animals in which to study the peridental membrane, the cement organ, and the so-called Nasmyth's membrane is that the entire sac wall is better developed for this purpose in these animals than in those of the higher vertebrates.

Waldeyer believes that the "enamel cuticle" will be found upon all teeth. He believes that the cells of the external epithelium of the enamel organ become applied to the surface of the enamel and there cornified. Tomes says in reply to this theory, "the extreme thinness as far as it goes is an objection to this supposition; a more weighty argument against it is the absence of analogy for such a peculiar change by which one portion of the same organ is calcified and the rest cornified."

In answer to Tomes it is only necessary to say that there are two distinct conditions existing on the surface of the enamel, one is smooth, the other has pits

and furrows. The smooth enamel has the cornified membrane while the pits and furrows contain cementum, the difference being the degree in development.

The fact of the matter is, the enamel, as all of my pictures show, is completed through the internal epithelial layer and the stellate reticulum. The external layer is attached to the sac wall. The sac wall and the external epithelial layer may develop much larger than the fully formed enamel. The sac wall may and often does contract upon itself filling in the space occupied by the stellate reticulum. There is, however, no relationship between the external epithelial layer or the sac wall since the enamel is complete and a space always exists, except in those malformed crowns when the space is filled with cement. It is not unlike the head of the penis and the foreskin, each is entirely independent of the other, although they may come in close contact.

Later writers are of the opinion that these cavities and deformities in the crowns and enamel of the teeth are filled with vegetable substances, which have collected in the act of mastication. These vegetable cells, to my mind do not resemble encapsuled lacunæ. This theory cannot hold since I have found these encapsuled lacunæ with partly calcified embryonal structure in the deformed crowns before the tooth has erupted.

Early and late writers state that when the tooth erupts the membrane is destroyed in mastication. This could only happen when it is strongly attached to the crown of the tooth by a deposit of cement in cavities in the enamel. Such a condition could only occur in the carnivora and in the human upon rare occasions.

Tomes says: "Over the enamel of the crown which is not coated by a thick layer of cementum there is an exceedingly thin membrane, the existence of which can only be demonstrated by the use of acids, which cause it to become detached from the surface of the enamel."

My own researches show that the external epithelium and the sac wall do not in any way come in contact with the

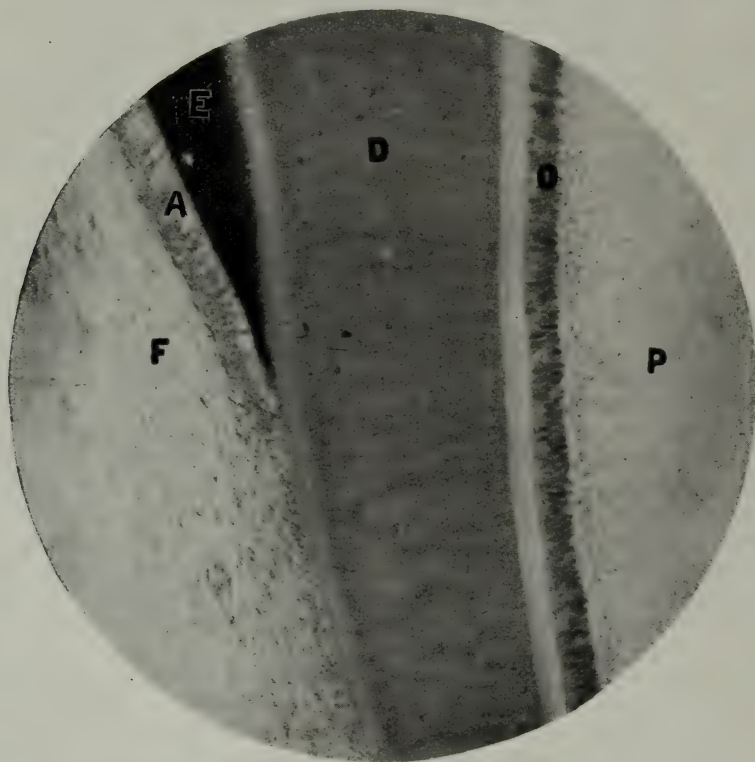


fully developed enamel, only so far as the contraction of the sac may draw nearer to the crown of the tooth, but there is no affinity between them nor do they unite with each other at any point, except when cement is to be deposited in crown fissures or pits.

Again Tomes says: "The inner surface of Nasmyth's membrane is however pitted for reception of the ends of the

The pressure of the erupting crown against the sac at its most prominent point causes the sac to become thinner at this locality. The shape of the so-called Nasmyth's membrane, therefore, in most cases is tapering in thickness from the extreme edge as it approaches the neck of the tooth. Nasmyth's membrane, as we shall see, is usually composed of two layers with a dark or purple line divid-

FIG. 1.



(Magn. 110.)

enamel prisms, which may have something to do with this reticulated appearance; as though it was made up of epithelial cells." My pictures show why the inner surface of the sac wall is pitted for the reception of the enamel prisms and why Nasmyth's membrane is partly made up of epithelial cells.

Having in a measure harmonized the views advanced by the early writers we shall now consider my own researches.

ing the two in the middle; one, the original fibrous sac specialized, the other, the external epithelial layer. The external epithelial layer is not always present or continuous; we frequently see this layer only in places with spaces on a continuous fibrous band, especially that part which originally covered the crown.

The time when the external epithelium severs its connection with the internal epithelium, after the enamel is completed

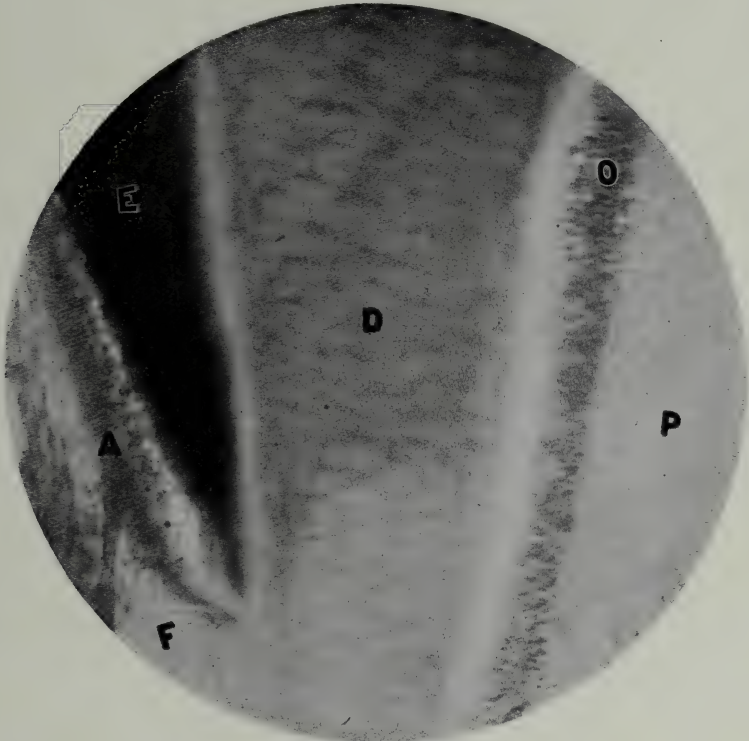


up to the occurrence of the eruption of the tooth, varies in different animals and in the human. In animals only a few weeks or months are involved, while in the human from one to fifteen years elapse. In the meantime, in many cases if nourishment is not provided, the external epithelium will partly or entirely disappear before the eruption of the tooth occurs.

the gingival space. The remains of the epithelial layer now being held together by the fibrous sac faces the crown of the tooth across the gingival space.

The fibrous sac may have developed a few cementoblasts as high up as the gum margin, or possibly a layer or two of cement substance containing lacunæ may be found at the neck of the tooth and in depressions of the enamel, as suggested

FIG. 2.



(Magn. 110.)

When the tooth erupts and passes through the gum tissue, absorption of the external epithelial layer first takes place at the most prominent part of the crown; second, the fibrous sac, and third, the gum tissues are absorbed. As the crown of the tooth passes through the alveolar wall into the mouth, the tissues including the epithelial layer, sac wall, and gum tissue, are forced apart and take their positions upon the opposite side of

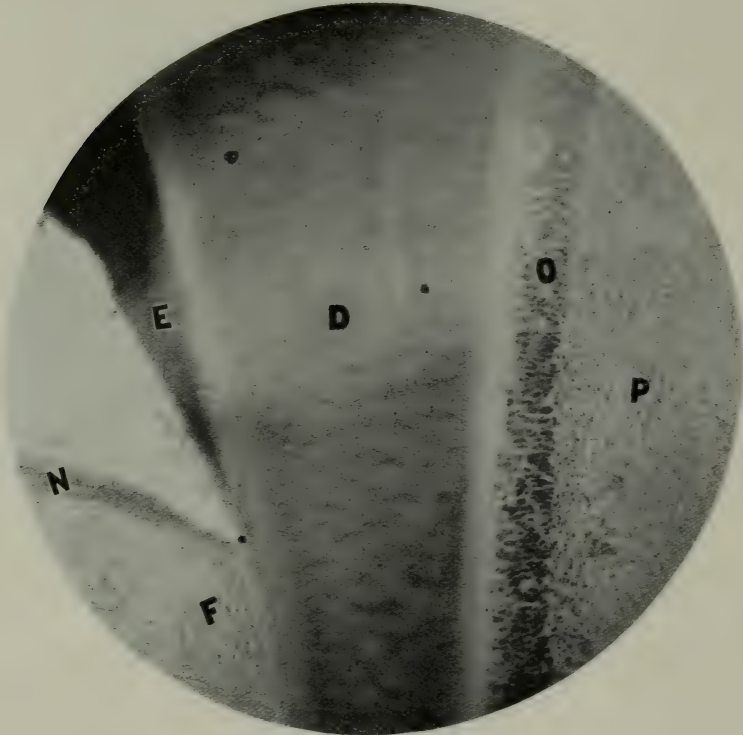
by Tomes. The membrane is capable of developing cement at the necks of the teeth where there are cavities and broken edges due to irritation. Not infrequently, when abnormal development of the enamel occurs, the external epithelial layer and even the fibrous sac will attach itself to this locality and remain upon the surface of the crown after it has erupted.

Fig. 1 shows the germ of a second

premolar tooth in the jaw of a dog. All the structures are beautifully demonstrated: A is the outer epithelial layer, D the dentin, P the dentin papillæ, E the enamel, F the follicular wall, and O the odontoblastic layer. Over the fully formed enamel at the cervical margin is seen the outer layer of the enamel organ, with the fibrous sac (follicular wall) attached to its outer border.

D the dentin, P the dental papillæ, E the enamel, F the follicular wall, and O the odontoblastic layer. The enamel organ has finished its work of developing the enamel and the external layer has begun separating itself completely from the finished product. The outer row of cells is plainly seen with a space between the cells and the enamel. Please note that the separation begins first at the thinner

FIG. 3.



(Magn. 110.)

Atrophy of the cells is taking place. The inner layer which has for its function the development of the enamel has discharged its duty, and the outer layer still attached to the inner border of the sac is trying to sever its relation with the fully formed enamel at its lower border.

Fig. 2 is the side of the crown of a second premolar tooth of a dog in a follicular sac showing all the tissues in place: A is the external epithelial layer,

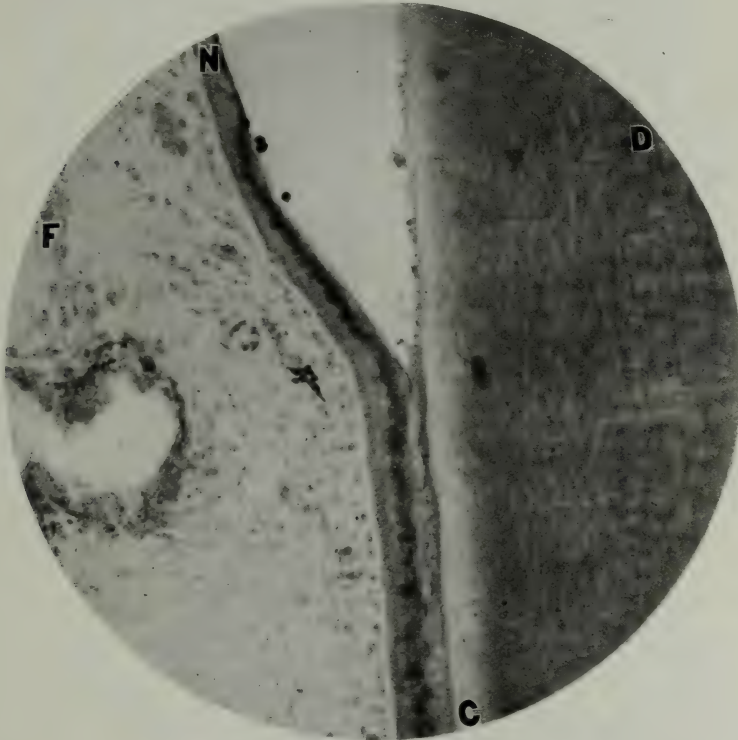
edge of the enamel. The space between the edge of the enamel and the sac is protected by the external epithelial layer and, therefore, the space between the cementum and the enamel exposing the dentin at the neck of the tooth.

Fig. 3 shows a further and complete separation of the remaining part of the enamel organ and sac wall in a dog from the completely formed tissue of enamel: D is the dentin, P the dental papillæ, E

the enamel, F the follicular wall, N now the so-called Nasmyth's membrane, and o the odontoblastic layer. The gingival space is quite well defined. The remnants of the enamel organ, the outer epithelial layer, are still in complete attachment to the fibrous sac, which has become very thin on account of the pressure and absorption. In all these pictures it will be noticed that the amelo-

of a sheep. The picture is taken at the upper margin of the gum tissue: c is the cementum, D the dentin, F the fibrous tissue of gums and sac, and N the so-called Nasmyth's membrane. It clearly shows the membrane, a dark line extending along the free margin of the inner surface of the gum tissue and extending quite a distance beyond, which does not show in the picture. There is enough

FIG. 4.



(Magn. 230.)

blastic cells of the internal epithelial layer when developed stop at the point where the enamel organ ends, and the fibrous tissue of the sac which covers the outer layer of the enamel organ continues at that point, covering the surface of the end of the root. Note a dividing line in the center of the external layer. In this picture the external epithelium does not extend below the neck of the tooth.

Fig. 4 is the permanent incisor tooth

structure to cover one-half of the crown, while upon the other side of the root there is a like amount, which if brought together would cover the entire surface of the crown. As the tooth erupts, the membrane is separated by absorption at the most prominent part of the crown. It will be seen that the inner surface of the gum margin is continuous with the cementum.

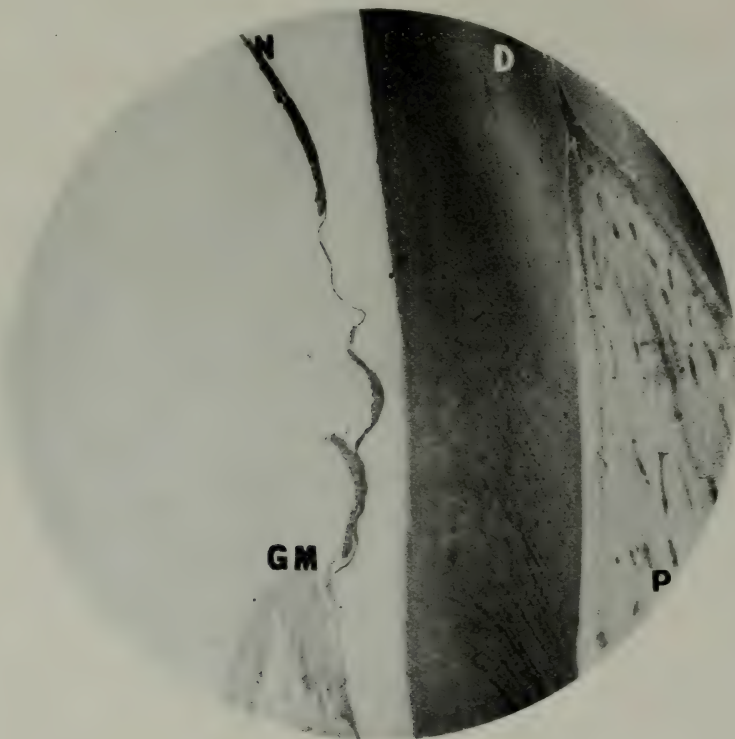
Fig. 5 shows the picture of the same



tooth higher above the gum margin: *D* is the dentin, *P* the dental pulp, *G M* the gum margin, and *N* the so-called Nasmyth's membrane. The fibrous tissue of the sac may be seen with partly calcified epithelial cells hanging from them. In many places the cells have separated from one another. The cells are also torn from the fibrous sac at different localities:

Fig. 7 shows the cross-section of the crown of a lamb's tooth: *G* is the gum tissue, and *N* the so-called Nasmyth's membrane, which can readily be seen. It is taken through a two-inch eye piece, low power, to get as much surface as possible. The membrane encircles the crown, part of which is exposed and part still within the jaw. It is attached to the tooth as far as the gingival space

FIG. 5.



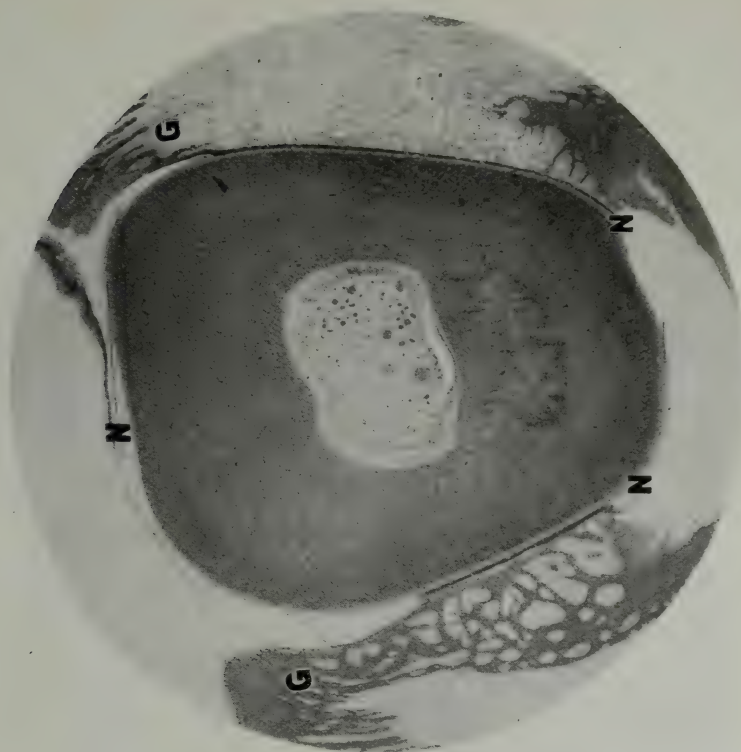
(Magn. 24.)

Fig. 6 is a larger amplification of a part of the so-called Nasmyth's membrane, taken from Fig. 5. It shows the inner surface of the sac *K*, to which is attached the cornified layer of the external epithelium *M*. Some of the cells are torn away from the fibrous tissue leaving the prismatic depressions in the tissue as suggested by Tomes. A line of demarcation is seen separating the two structures throughout the entire picture.

where it deflects to the opposite side, which nearly always occurs on the eruption of the tooth. The root and crown are smooth and, therefore, the membrane is thin and semi-calcified (cornified).

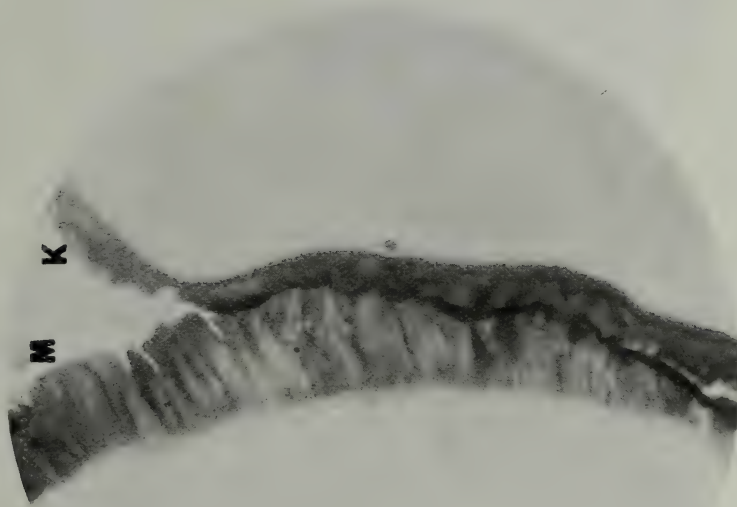
Fig. 8 is a cross-section of a root of a lamb's tooth: *C* is the cementum, *D* the dentin, and *P* the pulp. At *C* is seen a slight malformed depression in the root. The cementum has filled in the cavity and the surface is almost smooth.

FIG. 7.



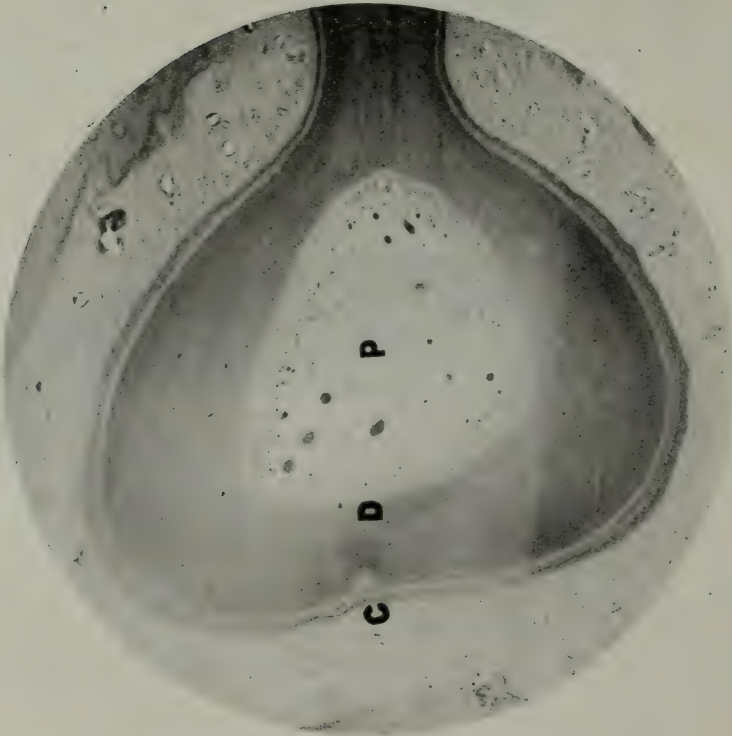
(Magn. 24.)

FIG. 6.



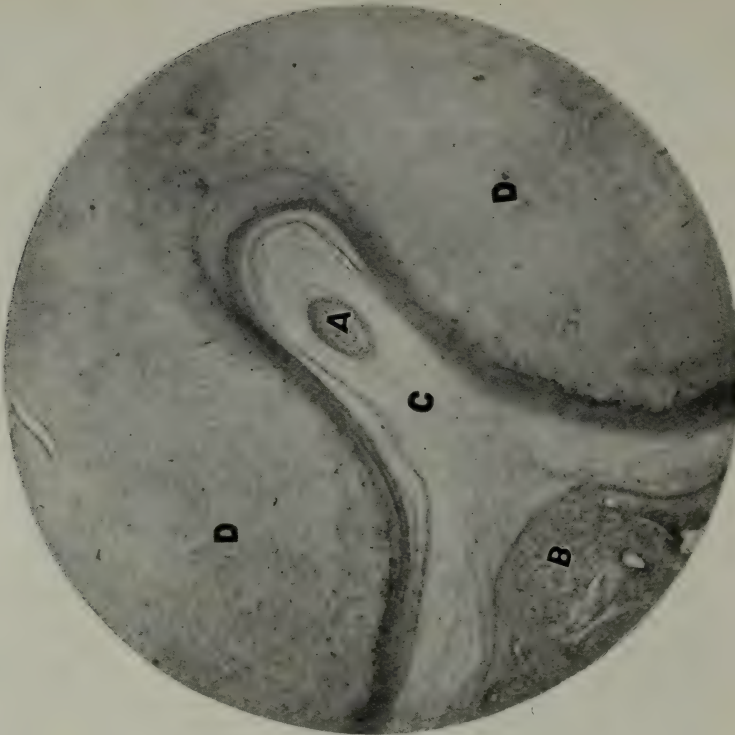
(Magn. 230.)

FIG. 8.



(Magn. 36.)

FIG. 9.



(Magn. 47.)

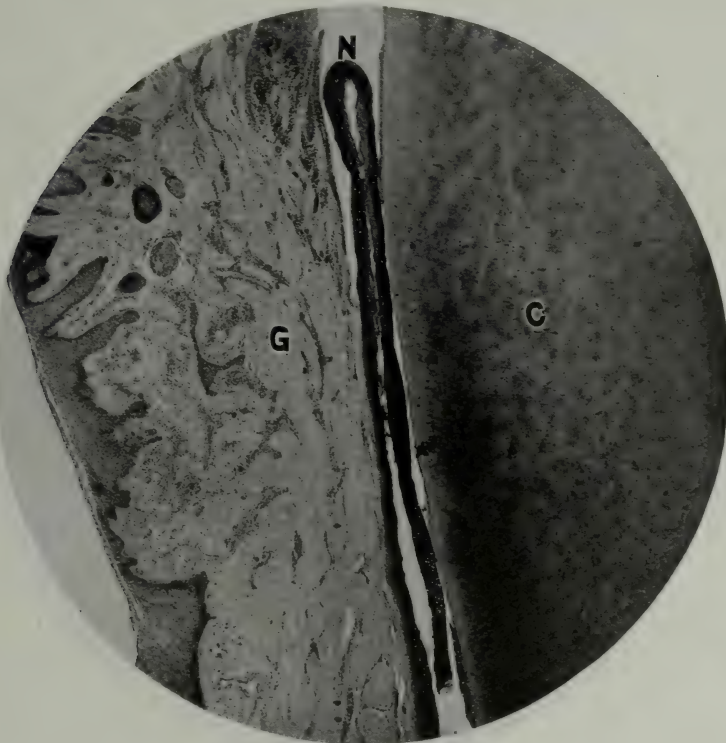


Lacunæ are present but do not show in the picture.

Fig. 9 is a cross-section of the root of a human bicuspid tooth: A is an artery, B the peridental membrane, C the cementum, and D the dentin. This depression is an extreme in the opposite direction. This large space is filled in with true cementum and the lacunæ can

cementum and epithelial layer, being soft, have detached themselves from the crown but are still firmly attached to the peridental membrane for the entire length of the root. The union of the gum tissue at the cervical margin, at G, is readily seen. There is no question as to its extension and union at the cervical margin.

FIG. 10.



(Magn. 37.)

be seen with the naked eye. The same development takes place in the crowns of teeth when there are deficiencies as take place upon the roots. The thickness of the embryonal tissue depends on the depth of the cavity and whether or not the crown is smooth.

Fig. 10 shows a section of tooth, gum, and alveolar process at the cervical margin in a man thirty-seven years of age: C is the crown, G the gum tissue, and N the so-called Nasmyth's membrane. The

Fig. 11 shows another human tooth: C is the crown, G the gum tissue. There can be no question as to the identity of this mass of material at N with the so-called Nasmyth's membrane.

What is understood as Nasmyth's membrane is not always confined to the outer surface of the tooth. I am demonstrating for the first time what might be called Nasmyth's membrane in the pulp cavity.

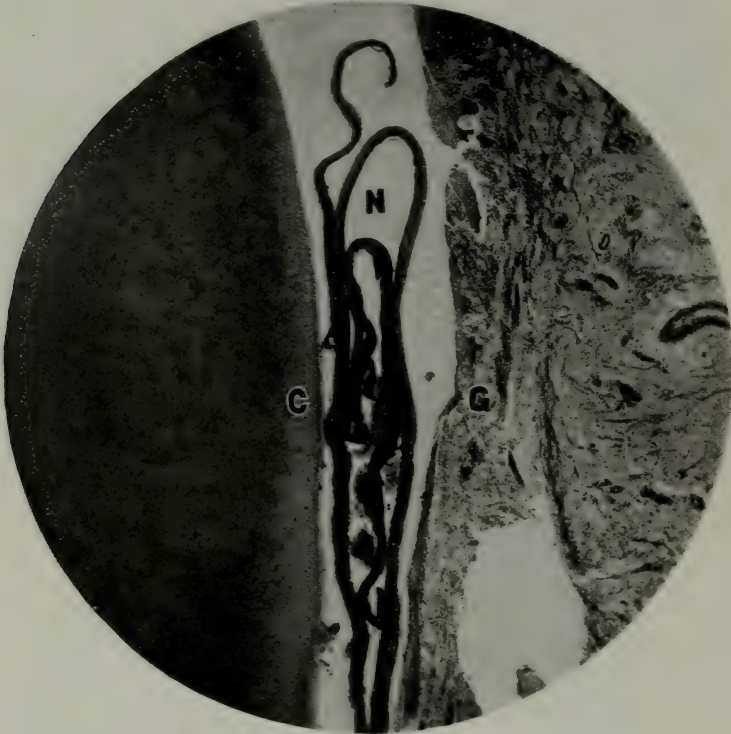
Fig. 12 is taken at a point in the root-

canal just below the pulp chamber, in the root of an inferior molar tooth of a man thirty-seven years of age: *D* is the dentin, *O* the embryonal odontoblastic layer. The pulp had died and the pulp chamber had been filled with gutta-percha. The odontoblastic layer remained attached to the dentin. The soft tissues of the pulp have decomposed and disappeared. Cells, whether epithelial or odontoblastic,

membrane which covers the root of the tooth. It undergoes the degree of cement development according to its environment.

These structures acted upon by acids in the laboratory for the purpose of preparing them for the microscope cause the hard substances in both tissues to become like horn. They are tough and when burned smell like horn. Na-

FIG. 11.



(Magn. 37.)

which eventually calcify, treated by acids in their embryonal state, produced membranes not unlike one another under the microscope.

The structures, therefore, which formed the so-called Nasmyth's membrane, are the external epithelial layer of the enamel organ and the aborted peridental membrane of the inner surface of the sac. This aborted membrane is a continuation of the normal peridental

turally, it is not as hard as the enamel, because it is not organized material but is embryonal in character. It is indestructible in acids because of its fibrous nature and, hence, tough in character.

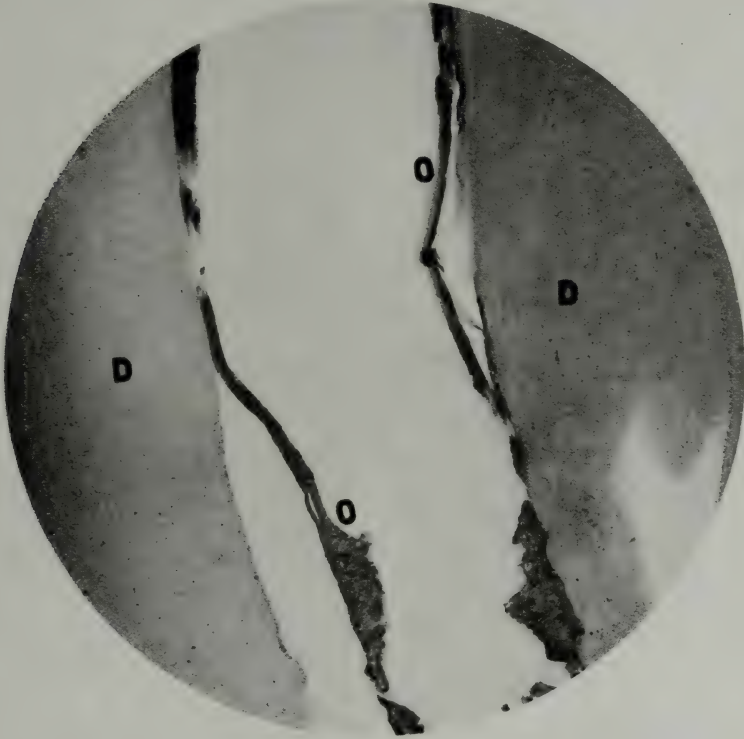
In summing up the mass of evidence already demonstrated to obtain a clear and logical idea of Nasmyth's membrane, we must first briefly consider the evolution of cement substance. In my work upon "Developmental Pathology: A

Study in Degenerative Evolution." I have shown that every organ and tissue of the body in their evolution from lower vertebrates to the higher, undergo a change to adapt themselves to new environments. These changes are arrests of development in phylogeny and ontogeny. Arrest in phylogeny is a condition which exists in a human organ or structure resembling vertebrate forms;

Nasmyth's membrane from two stand-points; first, with teeth that have cement on the crowns, and second, with teeth that have no cement on the crowns when normally developed.

There is a complex blending of the dental tissue in the crowns of the teeth of the herbivora and other animals, whereby the teeth are made efficient instruments for the mastication of veg-

FIG. 12.



(Magn. 45.)

namely, a fish, reptile, bird, or mammal, and hence is called a reversion. Arrest in ontogeny is a condition which exists in an organ or structure that has not attained to the full development of the human type.

In the evolution of vertebrates up to man, there is a constant change in the different structures of the teeth, especially of the cement.

We must consider the subject of

etable substance. The enamel and cement alternate with the dentin to form the substance of the crown. The enamel extends to the division of the crowns of the teeth into fangs and "consequently for some distance into the socket in young ruminants."

In ruminants only a thin layer of cement is found on that part of the tooth which is covered with enamel. The cement is more thickly deposited at the



ends of the roots and in the clefts or enamel-folds of the crown.

On the other hand, in the carnivora and man, the cement in the crown is not required, for the reason that the crown of the tooth is entirely covered with enamel. Human teeth are shaped for different purposes than those of the ruminants, and therefore in tooth evolution the structures which develop the cementum on the crowns degenerate.

I have shown that by treating the external epithelial layer of the enamel organ with acid and staining the same, a bluish or violet color is produced. This is due to the fact that when the epithelial cells lose their nuclei and granu-

lation of the body of the cells takes place, they take the stain and retain the color. By tracing the violet line it can be readily outlined for its entire length, which may extend part way or encircle the entire outer surface of the dentin upon the roots of the teeth.

According to the dictionary of the American Medical Association, "a membrane is a thin layer of tissue which covers a surface or divides a space or organ." Whether Nasmyth's membrane exists or not each individual must decide for himself.

31 N. STATE ST.

(To be continued.)

## Gradual Expansion *vs.* Bone-Grafting in the Mandible.

By VETHAKE E. MITCHELL, D.D.S., New York, N. Y.

**B**Y the above title I do not wish it to be inferred that, in all cases where there has been a loss of a portion of the mandible, gradual expansion without bone-grafting is the proper course to pursue. Each case presents conditions that must be carefully studied before a decision is made as to a procedure to bring about the desired result.

Attempts at restoring lost portions of the mandible by artificial substitutes have not proved satisfactory. It is essential that the gap be bridged by means of vital bone and this can be accomplished in only two ways, *viz.*, a regeneration of new bone, or by grafting in a portion of bone from some other part of the body.

Bone-grafting into the mandible is a major operation with so many chances of failure against it that it should only be attempted as a last resort. When a portion of the mandible, not too extensive, is lost through traumatism, the

contraction of the tissues will draw the ends of the bone together and a union will take place. When this occurs it will not only interfere with the mobility of the mandible but upset the occlusion of the teeth, destroying the function of mastication and interfering with speech. Before osseous union takes place a slow and gradual expansion of the parts to their normal position can be accomplished by mechanical means, and a regeneration of bone will fill the gap.

To illustrate the method of procedure I will cite a case in practice. Mr. S. age twenty-five, private, Marine Corps, wounded in action July 1918 by a machine-gun bullet. The bullet entered the mouth at the position of the superior left lateral incisor tooth, shattering its crown and passing through the mandible, carrying away several of the lower teeth and part of the bone. A history of the treatment given in France is very vague and will not be narrated here.

FIG. 1.



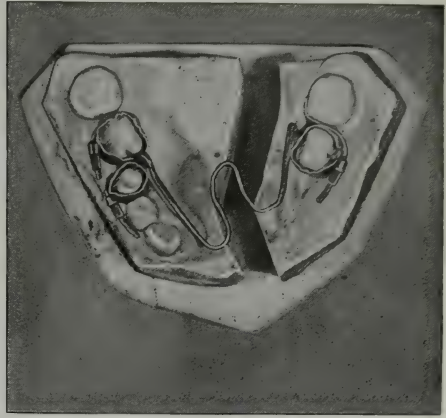
Photograph of patient when presented.

FIG. 2.



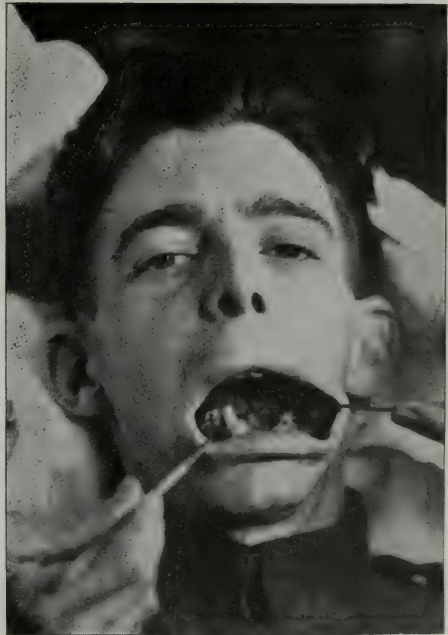
Models of the mouth at that time. Lower model separated at point of fracture.

The patient (Fig. 1) was returned to this country in April of this year (1919),  
FIG. 3.



Lower model with expansion appliance in position.

FIG. 4.

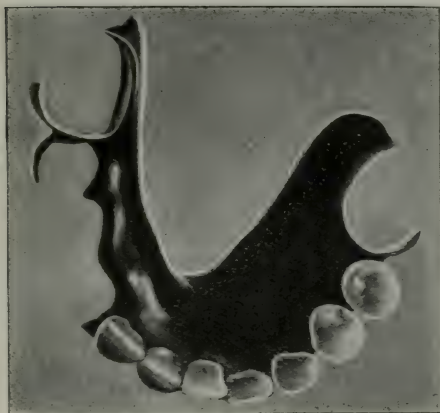


View of mouth with expansion appliance in position.

and sent to a reconstruction hospital in this city, of which Dr. H. S. Dunning

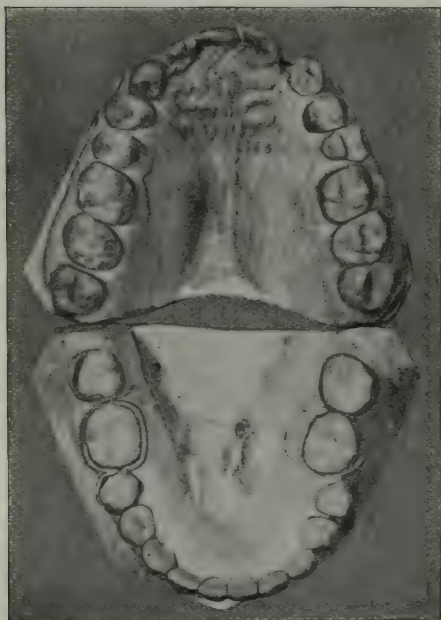
is the chief of the mouth and jaw department. A bone-grafting operation

FIG. 5.



View of the permanent restoration.

FIG. 6.



Models of the mouth, with the restoration in position.

was decided upon, and the patient referred to me for the purpose of making

a splint for the case prior to the operation. Impressions of the mouth were taken and models made. (Fig. 2.) The ends of the bone were drawn together by the tension of the muscles and the contraction of the tissues with only a fibrous union of the parts.

When the lower model was cut apart at the point of fracture and the teeth placed in normal occlusion with the

FIG. 7.



Photograph of patient with restoration in place.

upper model a space of fully one-half inch appeared in the model at the point of fracture. (Fig. 3.) This showed the amount of bone missing from the mandible.

After a careful study of the conditions and consultation with Dr. Dunning, it was decided to attempt the gradual expansion of the remaining portions of the mandible to a normal position, hoping at the same time for a regeneration of bone in the gap. To accomplish this, clamp bands were fitted to the second



bicuspid and second molar teeth on the right side (the first molar had been removed some years previously) and soldered together, with an upright tube on the lingual surface. A band was also fitted to the second molar tooth on the left side with an extension to the lingual surface of the third molar and also an upright tube on the lingual surface. A W-shaped spring of 18-gage clasp metal wire, with the ends bent at right angles to engage the tubes, was the force used for the spreading (Fig. 3), which was begun in July and completed in October.

This appliance was then removed and a permanent splint, made of 15-gage

clasp metal wire conformed to the normal arch and soldered to gold caps fitted to the second molar teeth on each side, was cemented into position. (Fig. 4.) A removable restoration was then made to restore the lost teeth and tissue, extending from the cuspid tooth on the right to the second molar on the left side, which gave the patient a strong and serviceable jaw. (Fig. 5.)

A regeneration of bone has taken place and I am sure that within six months it will be of sufficient strength to allow the removal of the splint.

17 EAST 38TH ST.

## Malocclusion of the Teeth Among North American Indians: The Sioux.

By FREDERICK S. McKAY, D.D.S., New York City.

(Read before the annual meeting of the Eastern Association of Graduates of the Angle School of Orthodontia, New York, May 5 and 6, 1919.)

IN considering the etiology of malocclusion, the older textbooks arrange the causes under two general heads: hereditary and acquired, and although the acquired causes seem in the opinions of these authors to far outweigh the others, it is no doubt true that much greater significance was attached to the influences of heredity in bringing about malocclusion than the present day concepts are willing to concede.

As a factor in bringing about this shift of position, the more intensified study of the environmental influences by a large and constantly increasing number of observers has contributed in no small way, and many causes operating directly upon the dental arches and upon the component parts thereof within the mouth cavity and upon adjacent intimately related structures have helped in lifting

the veil of obscurity that heretofore has concealed and masked these powerful influences, which at the present time are recognized as being the chief, if not the only factors, that are really intimately concerned in producing the principal phases which malocclusion assumes.

Even a most casual reading of the literature of orthodontia during the past few years gives one a distinct impression that malocclusion is a perversion of the normal that has made its appearance or at least gained in intensity, because of the introduction of influences into childhood life that were not present in the child life of previous generations, and certainly not to be found associated with the life of what we commonly call primitive races.

In pursuit of this theory the various collections of skulls of more or less prim-

itive peoples in the museums of this and foreign countries have acquired a peculiar and powerful fascination for students of what I venture to term "malocclusion anthropology," in the hope that some definite dividing line could be established, which would separate the modern era of almost universal malocclusion from the older era in which the human dentures were developed, unhampered by the more or less mysterious disturbing influences.

It is probably correct to state as a rule, that the further back we go the less frequent do we find disarrangements of occlusion, and it is most certainly true that some of the common phases of malocclusion, as we know them at the present time, are wholly absent.

An addition to the rule would be to state that, as our examination progresses toward the modern age, new and striking aspects of malocclusion make their appearance and with increasing frequency. It should also be said that even in very old skulls examination has revealed malocclusion of surprising severity.

From the beginning of my own introduction to the study of malocclusion, I have noticed time and again the peculiar fascination which the study of primitive man has held for those whose work lay in orthodontia, as though by peering backward into these dim and unwritten ages we might possibly discover some facts, that would help to explain the things that perplex our minds and exhaust our energies.

Students of ethnology are agreed that the world over there are few fields that excel in ethnologic lore our own continent of North America, even within the borders of our own nation, and he must be most unimaginative in mind and perception who is not moved to awe and amazement by the wealth and variety of cultural remains that exist almost at our very doors, particularly in the Southwest.

The origin, history, and traditions of the older cultures like that of the Cliff dwellers have most unfortunately been lost through the extinction of these peoples, by what means we do not know, but we have access to a well-embellished

literature, compiled chiefly through the activities of our government, dealing with the customs and history of the North American Indians, from which we gain a comprehensive idea of their sociology and modes of life.

A knowledge of these, however, can give only the most rudimentary scaffolding upon which one could build any conception of the prevalence of malocclusion of the teeth, and we could go little farther than to argue that, because of their primitive modes of living, the survival of the fittest in the face of hard physical surroundings and the simplicity of the food habit, malocclusion could not exist except as a result of accidental injuries to the teeth and jaws, or because of some other equally unusual circumstances or conditions.

In making such a study as this, the North American Indian presents a most unusual and interesting opportunity. It is scarcely more than two generations between absolute savagery in certain tribes and localities and what I may be pardoned for want of a better term in calling "civilization."

#### INFLUENCE OF CIVILIZATION.

So rapidly has civilization thrust itself into contact with these people that the footprints of this vanishing race are still visible in the shifting sands of time, and from the standpoint of our study the influences of this contact are becoming apparent in a most astonishing way, for, let me assume, here are normal occlusion and malocclusion but two generations apart.

My first impressions on this subject were obtained during an examination of the Pimas for "mottled enamel" at the government school at Sacaton, Ariz., as described in *DENTAL COSMOS*, Aug. 1916, although my observations on this present subject were there set forth in the briefest way.

It was with no little surprise that I observed the extent and severity of malocclusion among these children, as I had a distinct impression that malocclusion was not common among Indians.



Since that time I confess to a growing desire, as opportunity could be made, to continue similar observations among different Indian peoples, and it was while making an examination of a district in South Dakota endemic to "mottled enamel" (*Journal of the National Dental Association*, July, 1918), that opportunity came to make observations among the Sioux.

Of all the tribes of North American Indians there is probably none which has figured more closely in the history and settlement of the great middle West than has the Sioux, and the last century was well toward its close before the bare mention of this tribe had ceased to strike terror to the heart of the average youngster.

The geographical distribution of this tribe was wider than the uninformed person has conceived and is described by Dr. W. J. McGee in the 15th Annual Report of the Bureau of Ethnology in these words:

The Indians of the Siouan stock occupied the central portion of the continent. They were pre-eminently Plains Indians, ranging from Lake Michigan to the Rocky Mountains and from the Arkansas to the Saskatchewan, with an outlying body stretched to the shores of the Atlantic. They were typical American barbarians, headed by hunters and warriors, and grouped in shifting tribes led by the chase or driven by battle from place to place over their vast and naturally rich domain, though a crude agriculture sprang up whenever a tribe tarried long in one spot.

No native stock is more interesting than the great Siouan group, and none save the Algonquian and Iriquoian approach it in wealth of literary and historical records, for since the advent of white men the Siouan Indians have played striking rôles on the stage of human development which have caught the eye of every thoughtful observer.

The term "Sioux," which has through various interesting ways come to be the popular designation of this great stock, is, I understand, not wholly satisfactory to these Indians themselves, as it "originally was a corruption of a term expressing enmity or contempt applied to a part of the Plains tribes by the forest-dwelling Algonquian Indians."

This is according to McGee, who states further that "according to Trumbull it was the popular appellation of those tribes which call themselves 'Dakota,' and was an abbreviation of 'Nadowessieux,' a Canadian-French corruption of a term which meant 'the snake-like ones' or 'enemies,' a term rooted in the Algonquian 'nadowe' (a snake)."

I gather that the best and perhaps the most acceptable name for this family is Dakota and thus they are often styled, although the less acceptable name Sioux will probably remain the common designation.

There seems to be one factor which not only strongly influenced the "chief arts and certain institutions and beliefs" of the Sioux, but determined their geographical distribution, and this was the buffalo. Indeed, the bison determined the eastern limit of the pueblo culture and north to the great Salt Lake and west to the Pacific. There is sufficient ethnological evidence to show that the original home of this family lay on the eastern slope of the Appalachian mountains, and it is also shown that "prior to the year 1800, the buffalo spread eastward across these mountains into the very land of the Sioux." Hence it seems that the size and disposition of this animal encouraged the art of the chase, thus discouraging agriculture, and as McGee puts it: "It can hardly be doubted that the bison was the bridge that carried the ancestors of the western tribes from the crest of the Alleghanies to the Côteau des Prairies and enabled them to disperse so widely over the plains beyond."

Such a life as these early unadulterated warriors and huntmen led could have resulted in nothing less than the most superb physical development, so from the standpoint of our search for what Angle has so aptly phrased, "the early dawn of the departure from the normal to abnormal in occlusion" it is of intense interest to chronicle, which I do with anything but pride, McGee's description of the change. He says:

Since the advent of white men the characteristics of the Siouan Indians, like those



of other tribes, have been somewhat modified, partly through infusion of Caucasian blood but chiefly through acculturation. With the abandonment of hunting and war and the tardy adoption of a slothful, semi-dependent agriculture, the frame has lost something of its stalwart vigor; with the adaptation of the white man's costume and the incomplete assimilation of his hygiene, various weaknesses and disorders have been developed . . . and it is fair to consider the stock in a state of transition from barbarism to civilization.

Dr. McGee's writings, from which I have taken these quotations appeared in 1893, so may be considered fairly modern, yet they antedate by several years the conditions to which this paper calls attention.

It can easily be conceded that one set of conditions would be found to be operative, influencing the life and physical development of children living in the primitive state prior to the establishment of the parental control of the government, and while this paper is not intended in any sense as a criticism of the methods of care and education employed by our government in dealing with these peoples, it is also easy to concede that the life history of these children is vastly different when housed in a government school during the greater part of each year and there brought within what we would ordinarily call the influences of civilization.

These conditions are not very different from those in the modern industrial boarding school and exemplify, according to my limited observation, a high degree of excellence.

Has this change in the Indian child's life been responsible, as the principal factor, in bringing about the extent of malocclusion that is easily apparent even in a hasty examination? This question cannot be answered except by observations vastly more extensive than have been made up to the present time.

#### HEREDITARY INFLUENCES.

Heredity is a powerful influence, if the conclusions of the most profound students of the subjects are correct, for

it succeeds not only in impressing itself unmistakably upon immediate generations of all biologic forms, but extends its tentacles over and through intermittent generations to bring about remarkable resemblances to ancestors more or less removed.

The most trustworthy evidence that can be assembled seems to indicate unmistakably that the plan of occlusion which we consider normal in the human denture, and so designate, extends back unaltered as far as we can trace it in primitive skulls, and we assume even back of the time when man first became man.

Surely this is a long and powerful descent, and if leading the simple or primitive life in the natural habitat is the means through which an unbroken hereditary lineage is preserved, then the Indian has brought to the very threshold of the time in which we live all the normality of occlusion that hereditary influence can bestow.

The Indian face has been considered as illustrating the harmony of features, according to type, that is brought about by normal development of the dental arches.

Angle, in a paper read before the American Society of Orthodontists at Chicago in 1905, gives several illustrations of Indian faces which he describes in these words: "They are fine and sturdy specimens of their race which is noted for good teeth; it is reasonable to suppose they have all of their teeth, and that they are in normal occlusion is evident from the beautiful harmony of proportion of the mouth with the rest of the face."

These same words would apply equally well in description of the faces of noted Sioux which are illustrated in Figs. 1 to 7.

In spite of the sudden change of environment in the last two generations, might we not reasonably expect that the hereditary forces would remain powerful enough to maintain the standard of normality?

In taking up now the results of a somewhat detailed examination of Sioux

FIG. 1.



Chief Red Cloud.

FIG. 3.



Afraid of Eagle.

FIG. 2.



Chief Goes to War.

FIG. 4.



John Hollow Horn Bear.

FIG. 5.



Alice Lone Bear.

FIG. 6.



Chief Hollow Horn Bear.

children and young adults at the Pierre and Rapid City boarding schools, both in South Dakota, some explanation is necessary.

In the first place I wish to express my indebtedness to Mr. Crandall, Superintendent of the Pierre School, and to Mr. House, Superintendent of the Rapid City School, for showing me every courtesy and consideration in having access to the pupils. On account of the limited time it was necessary to make the in-

FIG. 7.



Swift Dog.

dividual examinations hastily, in order to observe as many cases as possible and with the least interference with the school routine. Also the division of the school work into schoolroom studies and practical work out on the farm lands and workshops made only about half the school population available in a given half day, so the data are not as complete in volume as I would wish.

From the standpoint of a careful occlusal study as well as in obtaining illustrations of the conditions found, models of at least the pronounced cases



would be very desirable, but this was impossible for various reasons, so I shall have to rely upon photographic evidence, which is not as complete as I should like on account of the lack of time and difficulty of carrying sufficient photographic material.

The proportion of the various classes of malocclusion based upon the Angle classification and also the degree of "blood" are shown in the following table based upon an examination at the Pierre School:

Naturally there were more children of unmixed ancestry than of divided blood, so the findings in this respect are not of particular significance, except that they show that practically any phase of malocclusion can be exhibited in full-blooded Indians, and that the etiology is based upon some special circumstances that have affected those particular individuals.

It should also be recorded that five of the cases of malocclusion were, to say the least, largely contributed to by mutilations, by which I mean extractions, par-

PIERRE SCHOOL.

Class I.		Class II.—Div. 1.	Class II.—Div. 2.	Class III.
Full Blood	33	.....	Full Blood	1
$\frac{3}{4}$ "	2	.....	.....	.....
$\frac{1}{2}$ "	12	$\frac{1}{2}$ Blood	.....	.....
$\frac{3}{8}$ "	1	.....	.....	.....
$\frac{1}{4}$ "	1	.....	.....	.....
$\frac{1}{8}$ "	1	.....	.....	.....
	50	4	1	00
		Subdivision.	Subdivision.	Subdivision.
		Full Blood	Full Blood	$\frac{1}{2}$ Blood
		2	1	2
Normal (practically).		Unclassified.		
Full Blood	17	2		
$\frac{3}{4}$ "	4			
$\frac{1}{2}$ "	6			
$\frac{1}{4}$ "	1			
$\frac{1}{8}$ "	1			
	29			
		Total.		
		91		

In these 89 classified individuals 50 were in Class I and 29 could be classed as practically normal, leaving the remaining 10 scattered among the less common phases of malocclusion.

Of the 50 cases in Class I it should be stated that many of these were separated from practical normality by a very slight margin, so we may say that the tendency to normal, or to hereditary persistence if we choose to term it such, is more than usually strong. In fact, I have never before observed so great a proportion of normality in a similar number.

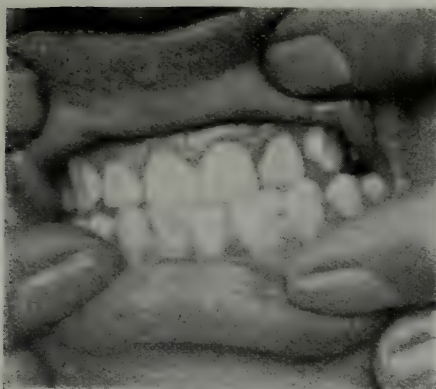
ticularly of the first permanent molars on account of decay. In fact, it is my distinct recollection that I observed cases that originally were not far from being normal, but which were thrown into severe malocclusional disarrangement through this unhappy necessity for extraction.

Three cases of the so-called "open bite" were observed, the etiology of which in general is of sufficient interest and fascination to warrant future consideration.

A curious coincidence was that of two

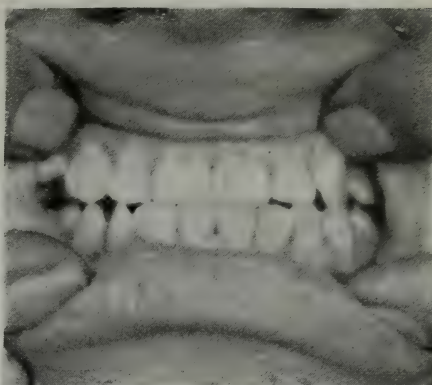


FIG. 8.



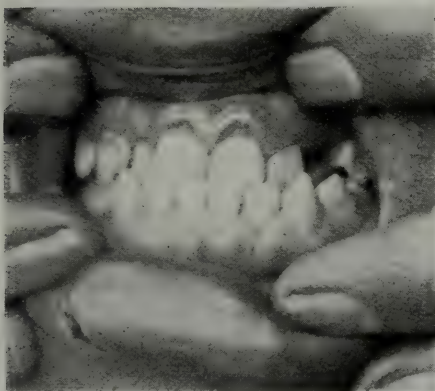
Julia Yellow Elk.

FIG. 11.



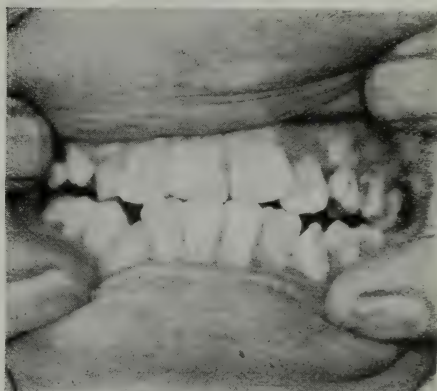
Josephene Claymore. Another Class III case.

FIG. 9.



Archie Little Eagle. Shows a Class I case in which the lower front teeth occlude mesially to the uppers.

FIG. 12.



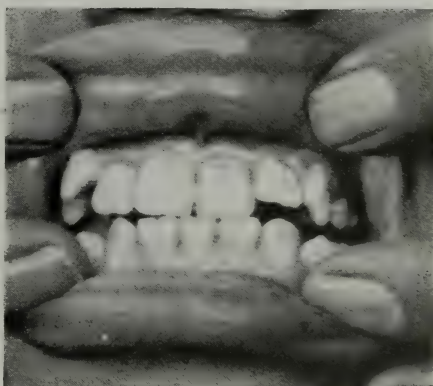
Johnny Little Skunk. A Class I case.

FIG. 10.



Louise Omaha. Shows a case of mesial occlusion of the lowers. (Class III.)

FIG. 13.



Irene Middle Tent. A Class I case, with only three lower incisors.



FIG. 14.



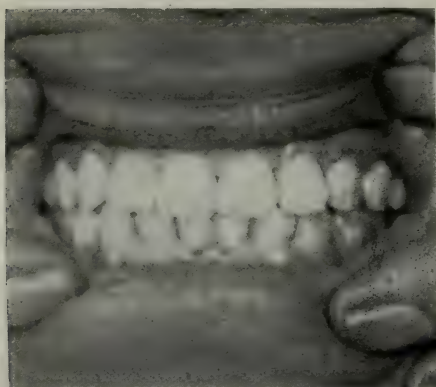
Blanche Mathieson. An "open bite" case.

FIG. 15.



Frances Knife. Very little variation from the normal.

FIG. 16.

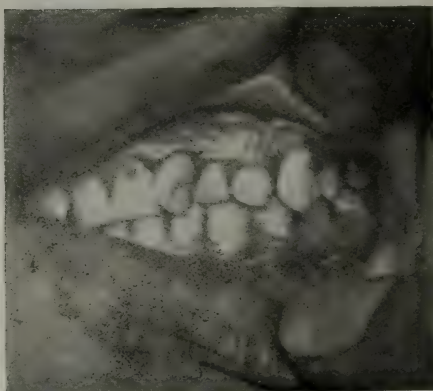


Bessie Owl-King. A normal occlusion. One of the best.

Another had a supernumerary lateral incisor situated in the hard palate.

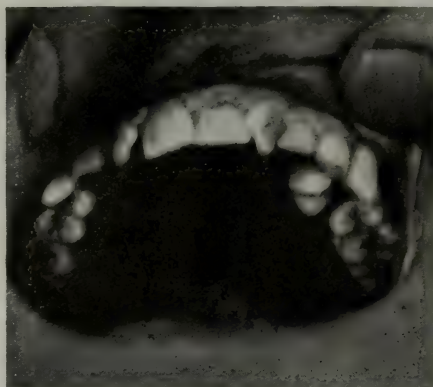
Still another showed a condition which I hesitate to record. The denture had

FIG. 17.



Shows the retention of the temporary upper left lateral incisor and cuspid with the permanent lateral and cuspid also in the arch with considerable torsion of the permanent lateral.

FIG. 18.



Shows the first bicuspid on the same side displaced palatally and between the temporary and permanent cuspids. In other words, the cuspid and first bicuspid are transposed.

been practically normal until what was no doubt a well meaning but, nevertheless, an extremely unintelligent interference had placed upon a molar a gold shell crown, which had been so badly designed as to disarrange the occlusion.

Thus does the noble Red Man reap the benefits of "civilization"!

In this group of pupils were many evidences of dental service in the way of

One remaining case, that of a girl of fifteen presented one of the most remarkable conditions of transpositions of certain teeth that I have ever observed. (See Figs. 17, 18, 19 and 20.)

FIG. 19.



Shows the right permanent lateral incisor rotated, temporary cuspid next in line in the arch, then the first bicuspid, and next the permanent cuspid labially displaced between the two bicuspids.

On this side the transposition of the cuspid and first bicuspid are in a reverse relation with the left side.

FIG. 20.



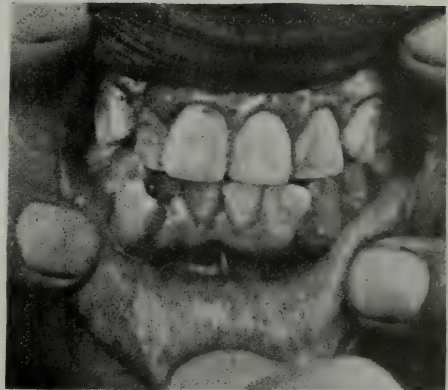
Shows the lower right cuspid labially displaced with temporary cuspid just distal.

fillings, which were generally good, but I noted 20 cases which had been mutilated by extractions which I assume had been necessary on account of decay.

FIG. 21.



FIG. 22.



The subject of this illustration bears the euphonious name of "Milly Runs-Over-Them," in searching for the origin of which one's imagination can easily extend back to some peculiar escapade of the parents in the tribal life. The malocclusion is pronounced.

During the writer's examination of the Pimas in Arizona (DENTAL COSMOS, Aug. 1916) attention was drawn to the serious prevalence of gingival irritations running into true pyorrhea even in children of fifteen or sixteen, and Fig. 21



shows a pronounced case seen at Rapid City, although I would say that such con-

FIG. 23.



Rose Swallow. Shows a typical distal occlusion of the lower arch with protrusion of the upper incisors, which one would hardly expect to find associated with an immediate descendant of an Indian, and the writer cannot but feel that this condition is accounted for by some special history of the individual.

FIG. 24.



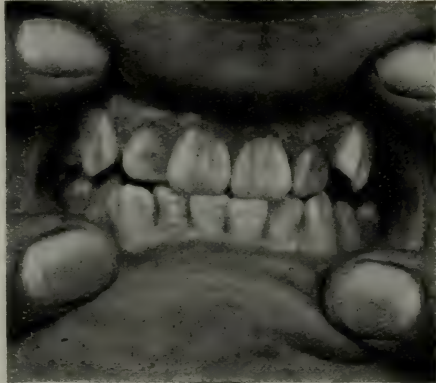
Rose Swallow. Shows the facial profile, which is easily associated with a malocclusion of this type.

ditions are more common among the Pimas than among the Sioux, at least so

far as my observations have extended. The illustration is shown here primarily to indicate a type of malocclusion.

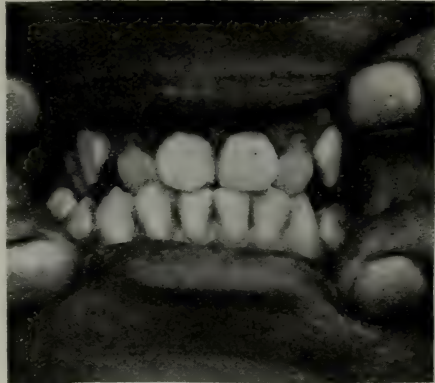
Had time and circumstances permitted, nothing would have illustrated

FIG. 25.



Shows a typical Class I case.

FIG. 26.



Rachael Tesson. According to a memorandum made at the time, this child showed evidence of adenoids, and it can be seen that the upper arch is very much narrowed through the bicuspid region. Otherwise the case is typical of Class I.

this subject better than to have photographed all of the pronounced types of malocclusion.

I had selected several individuals for photographing after the examination, but



the waning light of the shortening days, and the difficulty of holding these cases in conflict with duties on the farm and

Although this paper does not deal with the Pimas, I introduce some illustrations

FIG. 27.



Shows a lad of fourteen, whom I picked up at random as he came sauntering down the roadway, and who proved to possess beautifully arranged dentures.

FIG. 28.



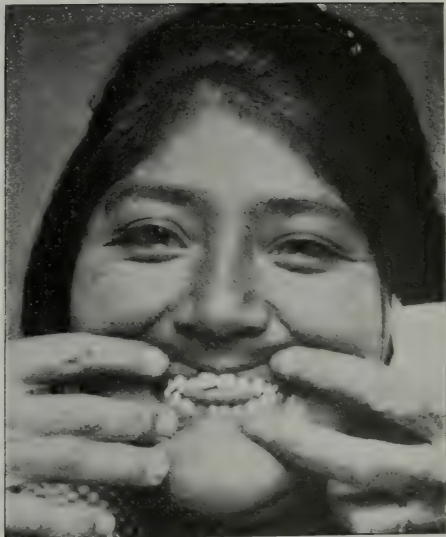
(Heap Big Chief) (Ketcham) shows a peculiar malocclusion, also mottled enamel and brown stain.

in the shops made it impossible. It would also be of unusual interest if I could have secured photographs of several of the best examples of normality.

FIG. 29.



FIG. 30.



FIGS. 29 and 30: (Pima) (Ketcham) illustrate an "open bite" case with its protruding tongue.

of this family obtained at the Sherman School at Riverside, Cal., by Drs. Ketcham and Gray. (Figs. 28 to 33.)

FIG. 31.

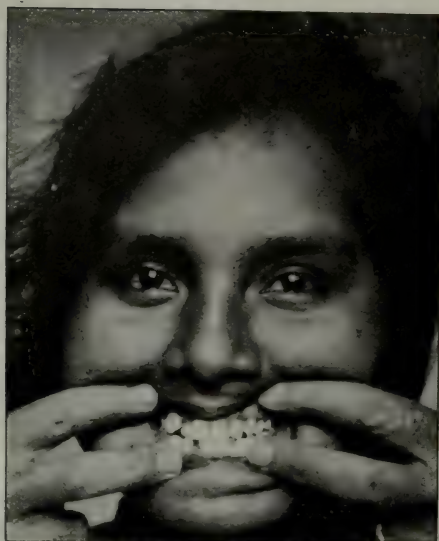


FIG. 32.

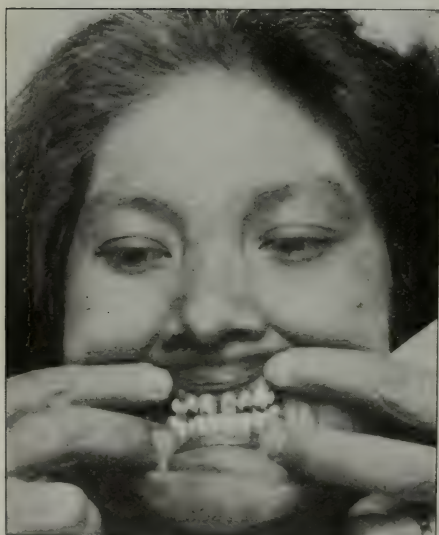
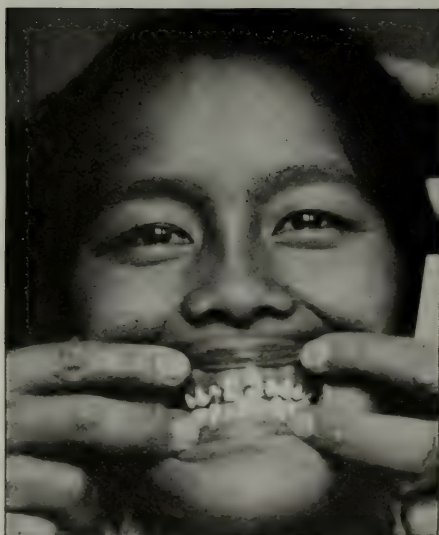


FIG. 33.



FIGS. 31, 32, and 33, (Pima) (Ketcham) show three common types of malocclusion, two of which also show the brown stain.

# RECAPITULATION OF PIERRE AND RAPID CITY SCHOOLS.

Class I .....	91	
Class II, Div. 1 .....	6	
Class II, Div. 1, Subdivision ..	3	
Class II, Div. 2 .....	3	
Class II, Div. 2, Subdivision ..	5	
Class III .....	1	
Class III, Subdivision .....	3	
Normal .....	65	(36%)
	177	

Even so superficial an examination as has been dealt with furnishes some basis from which to draw conclusions.

It would seem to me that the present generation of Sioux in a more extensive examination would be found to have brought down an hereditary normality in occlusion of probably 50 per cent. This would be allowing a fair percentage of "benefit of the doubt" toward the normal side.

It would also seem that a shrinkage of 50 per cent. from normality in possibly three generations shows a remarkable retrograde tendency that augurs ill for the race, and at the same time raises a question from the occlusional standpoint as to the beneficent effects of "civilization."

Of etiology I have said little, but a glance at the classification makes it apparent that the prevalence of malocclusion lies in those forms whose etiologic factors are the simplest and most common.

The more complex forms, such as are found in Classes II and III, the causes of which, with our present knowledge, are associated respectively with nasal obstruction and tonsillar hypertrophy, are not common among the Sioux.

What effect the continuation of the profound alteration of the food habit and housing in steam-heated dwellings, as well as the bacterial contamination of closer association with the white race, will have upon future generations of these peoples, can only be surmised.

In so far as present-day dental practice as applied to these people is concerned, it seems to be exerting itself in two ways exactly in contrast to each other.

The repair of carious damage is without doubt a useful and much-needed service to the Indians, but, on the other hand, a large number of malocclusions were observed which were in large measure contributed to by mutilations, more commonly of the first permanent molars, as mentioned in the paper.

Assuming that these were necessary under the circumstances simply emphasizes that the dental service applied at present could be enlarged to include proper prophylactic treatment with immense benefit to our wards.

46 WEST 51ST ST.

[See also *Discussion*, as reported under "Proceedings of Societies," this issue.]



## Root-canal Treatment Aided by Dental Radiography.

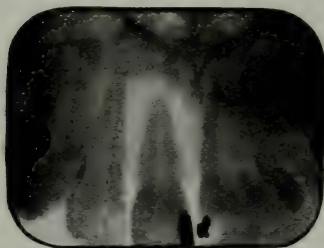
By FRANK J. ERBE, D.D.S., Waterbury, Conn.

(Read before the Connecticut State Dental Association, at its annual meeting, held at Hartford, Conn., April 15 and 16, 1919.)

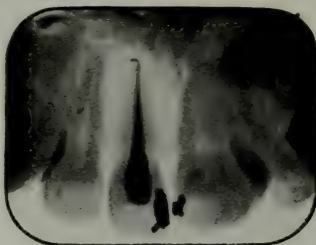
FROM the prominence you have given me on the program one might suppose I was about to give a paper. However natural that supposition might be, it is erroneous. This is only an illustrated clinic.

sulted, no matter how mild the antiseptic, in more or less irritation. Dr. Black made a statement claiming that all antiseptics were more or less irritating. About that time some other prominent men in the profession said that

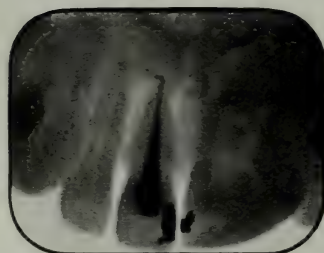
FIG. 1.



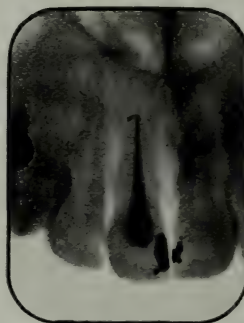
A



B



C



D

About three years ago the late Dr. G. V. Black published in his book on pathology the results of a series of experiments on the effects of antiseptics and germicides placed on the arms of dental students. Almost all of them re-

in root-canal work antiseptics were really of no great value. I was rather impressed with that, and immediately began to try it out in my root-canal work. I adopted the Callahan method of mechanically cleansing the canal with

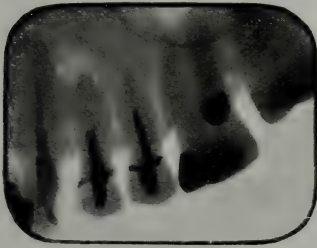
sulfuric acid and neutralizing the acid with sodium bicarbonate, endeavoring in every case to reach the apex of the root, and cleansing to the apex of the canal. After being sure that the canals were open to the apex and were thoroughly dried, I filled them with the solution of rosin and chloroform, which is supposed to fill all the dental tubuli. If the opening at the apex is small, it will also seal that. Then I used a gutta-percha solution, pumping that in with a great

of the canal and removal of the cause of infection is all that is necessary.

I might say a great many things here, but I cannot say anything that will tell you as much as the pictures I will show you. I think these few pictures speak volumes.

Fig. 1 A is the radiograph of a central incisor which presented with this large radiolucent area, as you see. The rubber dam was applied, the tooth wiped with iodine, and then washed with alcohol. I

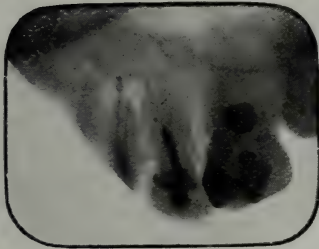
FIG. 2.



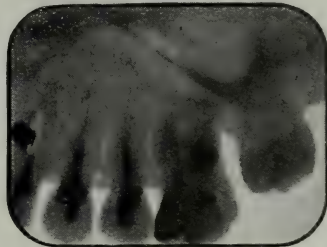
A



B



C



D

deal of effort and care, and followed with a gutta-percha cone, with the pumping motion continued until the filling was at least to the end of the root, and sometimes beyond. In some of those fillings I think I forced more material through the apex than was necessary, and in my later cases I avoided that. Some of those cases showed large radiolucent areas. The cases were radiographed both before and during treatment, and followed up for two and one-half years, and it seems to me it is proven that it is not necessary to use antiseptics in root-canals; that the thorough cleansing

made a large opening from the lingual surface, cleansed the canal in the manner described, and filled it at the same sitting (Fig. 1 B). Now, please notice in the next picture, taken six months later, the change which has taken place (Fig. 1 C). This next picture (Fig. 1 D) was taken two and one-half years later, and you see the condition is practically normal.

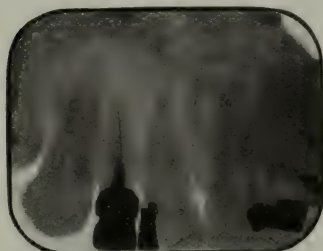
Fig. 2 A is a case carrying a crown. A portion of the root was not filled. Note the area of destruction around the apex. I first removed the crown. This was a very difficult case, and took con-

siderable time to find and clean out the two canals, but both were finally accomplished (Fig. 2 B). Then I succeeded in completely filling the two canals (Fig. 2 C). In Fig. 2 D I wish you to note the wonderful change that has taken place after two and one-half years.

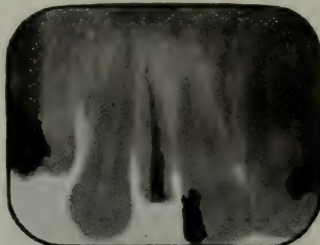
Fig. 3 C shows the condition six months later. I recrowned it, and it has returned almost to normal condition.

Fig. 3 D is a radiograph taken two and a one-half years later. You can readily see the difference. This is absolutely normal. No antiseptics were used,

FIG. 3.



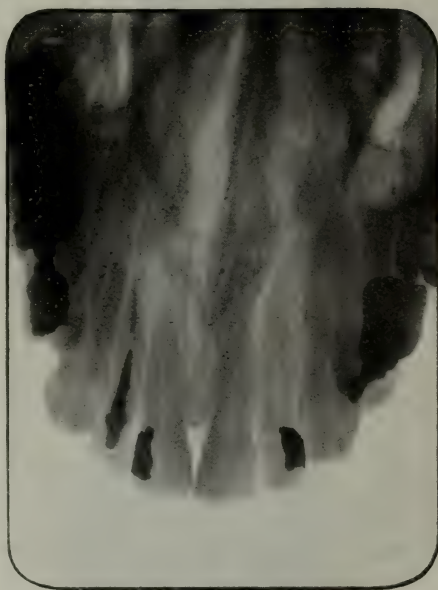
A



B



C



D

Fig. 3 A is a case carrying a crown and showing two broken instruments in the canal, with extended radiolucency about the apex. After removing the crown and cleansing the canal there was a free discharge of pus.

In this canal I put a cotton dressing, sealed it in, and had the patient come back in a week, when the canal was washed out with a saline solution. I did that for about six weeks. We are not supposed to fill a canal until it is perfectly dry. After six weeks there still seemed to be some slight seepage there. I said to the patient, "I am going to fill that today, and see what happens." I did so, and I will show you what happened. Fig. 3 B shows the condition right after filling.

nothing but a saline solution to wash out that pus pocket. There was no fistula present.

Fig. 4 A shows an anterior canal filled only about half-way to the end. I took that filling out and filled the canal again.

Fig. 4 B shows the distal root, with quite an encapsulation.

Fig. 4 C shows all the canals, the distal

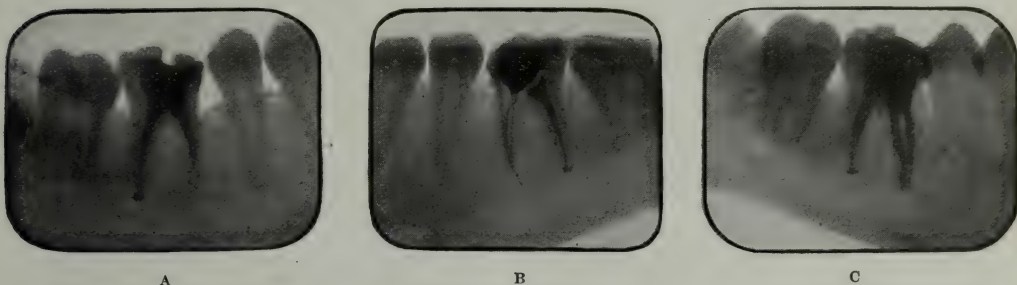


and the two canals in the mesial root filled perfectly. The purpose of this illustration is to bring out the point that it is possible to fill molar roots to the end, and fill them perfectly.

I was particularly interested in Dr. Howe's description of his method of root-canal treatment this afternoon. Dr. Howe said that the silver nitrate filling would be very apt to discolor the teeth,

Dr. ERBE. That brings to my mind another thought. They say a root-canal treatment is as important as an operation for appendicitis. I have thought of that very much in doing that work, and hope some day to make it as valuable as that to my patients. I have been doing a good deal of this work, but have not been getting as good a fee as the surgeon gets for an appendicitis operation!

FIG. 4.



and was not applicable to anterior teeth. This method can be used in the anterior teeth perfectly. Another point is in regard to discolored teeth. You not only treat the canal, but you bleach the tooth as well. In treating the tooth with sulfuric acid and sodium bicarbonate you will find it is as good a bleaching method as anything.

Dr. GAYLORD. I would like to ask a question, not through criticism, but through curiosity. I would like Dr. Erbe to tell us how much time was occupied in opening those anterior canals in that molar tooth?

To answer Dr. Gaylord's question, I spent six hours on that case. I have spent as much as eleven hours on a case—actual time, working very hard. The importance of the work is in the fact that if the treatment is not properly carried out the condition may in time be the cause of a serious streptococcic infection, undermining the patient's health and perhaps be the cause of death.

111 W. MAIN ST.

[See also *Discussion*, as reported under "Proceedings of Societies," this issue.]

## The Theory and Technique of the Complement Fixation Test in Blood Work and Its Application in Cases of Focal Infection.

By ARTHUR C. M. HERDLING, Orange, N. J.

(Read before the annual meeting of the New Jersey State Dental Society, Atlantic City, July 16-18, 1919.)

IN order that the theory of complement fixation tests may be understood, it is necessary that we have some knowledge of infection and immunity. On account of the magnitude of that subject, it is impossible to even attempt a résumé in this short paper, and only that part will be given which is necessary for general knowledge.

Some of us have a vague idea of the Ehrlich theories. It is sufficient for the purpose of this paper to know that for all bacteria there are substances produced in the blood stream to offset their toxic action, either by a neutralizing effect or by destruction of the cell proper. These substances are called cytolytins. Of the first class are antitoxins and antiferments, and of the other are precipitins and agglutinins, which precipitate or agglutinate the bacteria before final disintegration takes place. The antitoxins and ferments are of the simple form and agglutinins and precipitins are of the complex variety. There is another form still more complex, which is a combination of the two and requires the medium of another factor which is called the antibody or amboceptor. Ehrlich represents this amboceptor as having two grasping arms, one for the bacteria, which is the antigen, and the other for the ferment, which is the complement. The grasping arm of the amboceptor is specific for its antigen, and when so united with the complement

produces lysis or a dissolving of the antigen. This connecting link, the amboceptor, is called by Ehrlich a receptor body of the third order.

There are many varieties of cytolytins, one produced by bacteria, called bacteriolysins, another, hemolysins which cause lysis or a dissolving of the erythrocytes, and similar cytolytins are formed by practically all cells, such as the leucocytes, the epithelium, the kidney, the liver, etc.

So far, we have defined the three factors which are actively associated with complement fixation tests: (1) antigens, which are bacteria; (2) amboceptors or immune bodies, which have the power of dissolving the cells when associated with the complement; (3) the complement, which is the ferment required by the amboceptor to produce lysis or to dissolve the antigen. The manipulation of these factors and their values under various conditions constitutes the complement fixation test.

The serum of a person having an infection has with other substances, (1) antigen, (2) complement, and (3) immune bodies or amboceptors. In the test we use the patient's serum and search for the specific immune body, using various antigens.

In the human system the complement cannot be increased, but amboceptors (immune bodies) can be increased by immunization with vaccines. The com-

plement is destroyed or inactivated by a temperature of  $56^{\circ}\text{C}$ ., whereas the amboceptor is unaffected.

A hemolytic amboceptor for sheep cells will only unite with sheep cells and not with those of any other animal. A bacteriolytic amboceptor will unite with bacteria of the same species and no other. To make a hemolytic sheep cell amboceptor, the washed red cells of a sheep are injected intravenously in a rabbit. After several such injections and a suitable interval of time is allowed to elapse, the rabbit serum possesses immune bodies for sheep cells. This serum is now known as the sheep cell sensitizer, for when it is brought in contact with sheep cells and complement hemolysis results.

Bordet and Gengou in their efforts to prove that there was only one complement for all amboceptors, hemolytic and bacteriolytic, mixed bacteria and their amboceptors with some fresh serum containing complement. The mixture was set aside for an hour after which it was found that on the addition of corpuscles and their amboceptors, hemolysis did not occur. This phenomena is known as the Bordet-Gengou test and is the theory upon which Wassermann made his tests for syphilitic immune bodies in the serum of patients suspected of that condition.

Further experiments on immune bodies were made and various other bacteria were used as antigens and a technique was soon devised for the gonococcus, and recently Hastings and Ajopolis worked with the streptococcus and other organisms of the cocci group with great success.

There are two systems that may be employed, namely the inactive and the active. In the former, the serum to be tested is inactivated by heating at  $56^{\circ}\text{C}$ . in a water bath for 30 minutes to destroy the complement, the antigen whose amboceptor we are looking for is added with a small quantity of complement, which is the fresh serum from the blood of several guinea-pigs. The mixture is incubated at body temperature for an hour to allow the antigen to unite with

its amboceptor and complement. Sheep red cells with their amboceptors are then added, and if the specific bacterial amboceptor is present there will not be any hemolysis, but inhibition; in other words a positive serum for that particular bacteria, because the complement in the fresh serum was fixed by the bacteria and their amboceptors, and when the sheep red cells were added the complement could not act to dissolve or hemolyze them.

The other method, called the active system, uses the complement in the patient's serum and the patient's sheep red cells with their amboceptor and incubated for one hour. The serum is not inactivated and a more sensitive reaction occurs. After adding the sheep red cells the mixture is again incubated for half an hour or packed in ice for twenty-four hours.

It is evident that working with such small quantities as we do careful and accurate titration of the complement, amboceptor and antigen is necessary and gives us a means of standardizing these quantities for each series in terms of a unit. As we are working with serums, the amboceptor unit is that amount which will just hemolyze a given amount of red cells. To determine the amount of amboceptor in the serum of a rabbit immunized with sheep red cells, the serum is heated to  $56^{\circ}\text{C}$ . to inactivate it and varying amounts placed in a series of test tubes with a constant dose of fresh guinea-pig serum as complement and a constant amount of sheep red cells, incubated for one hour. The tube showing complete hemolysis is the quantity sufficient to fix the complement and red cells. The titration of the complement is made in the same way. There are innumerable difficulties involved in the actual tests, although the theory is very simple. Controls, both before and after, are necessary.

The study of antigens, their preparation and individual idiosyncrasies is a field in itself. The preservation of the antigens, complement and amboceptor is another difficult problem, and it is on account of these difficulties and the time-



consuming preparatory tests that it has not become common practice.

The recent pandemic era in focal infection demands the adoption of some such means to establish equilibrium between the radicalist and the conservatist.

#### APPLICATION TO DENTISTRY.

Where is the place of the complement fixation test in the practice of dentistry? There are many medical men who have been sending their patients to the dentist for radical extractions. There are many others who never think of the possibility of infected teeth being the cause of other secondary conditions. Some do not believe in focal infection at all. Strange as it may seem, the patient is the innocent victim one way or the other, and as a result either or both the physician and the dentist are deservingly open to criticism.

Bacterial infection manifests itself in the patient's serum. Bacteriology has classified bacteria and their haunts. The X-ray enables us to locate these areas and to study the normal and pathologic. Serology with bacteriology tells us what organisms are interfering with normal functioning.

Quite recently I have made some studies on bacterial infection, classifying them into cases of bacteriemia and toxemia. By bacteriemia I mean a condition where the organisms are actually in the blood stream. In these cases positive blood cultures were obtained and fixation tests were negative. In toxemia no organisms could be cultured and fixation for various organisms were positive. As a result of that data, I desired to find out what would happen to a normal animal by supplying a focal infection and then detecting what organism was the causative agent and how it would manifest itself. Working on animals is not truly scientific from one standpoint, for they cannot talk and tell their symptoms, so more scientific methods must be resorted to.

In one set of animals referred to as Group A, we gave injections of small

quantities of live mixed bacteria, some intravenously and others subcutaneously. The organisms used were all taken from cultures obtained from tooth infections, and streptococci predominated. As for being virulent, one cc. in a rabbit or pig did not kill. Injections of 1/10 cc. were given every second day for three weeks. Complement fixation tests were negative before, and positive at the end of that time, but *negative* three weeks later. X-rays of the gastro-intestinal tract were negative before and after three weeks.

To another series we fed the same bacteria mixed in with food 1/2 cc. daily. At the end of six weeks complement fixation was positive for streptococci; two out of six gave a positive culture for the colon bacillus and X-rays of the gastro-intestinal tract showed delayed peristalsis and stasis with ptosis. If in an animal we are able to produce these conditions by supplying a foci of infection, what prevents the same condition from being produced in man where there are harbored bacteria supplying toxins twenty-four hours a day from an infected tooth with additional secretion of toxin pressed out every time mastication is indulged in?

Of course there are other focal points than teeth. Fixation tests only tell us what organisms are involved, but until we clear up, whether it is tooth, sinus or other organ harboring the specific bacteria, we will not get results.

It is the old story of the rubber hose having ten or more holes, with a few twists and kinks. Straightening out the kinks and twists will not allow water to go through, but closing up the holes will give a normal quantity of water with pressure which will help straighten out the kinks if they have not become pathologic.

Granting, therefore, that there are many kinds of bacterial infection, how are we going to know which organism is causing the infection unless complement fixation is resorted to?

[See also *Discussion*, as reported under "Proceedings of Societies," this issue.]

## Complement Fixation Tests as Applied to Dentistry.

By ANGELO ZABRISKIE, D.D.S., Ridgewood, N. J.

(Read before the New Jersey State Dental Society, Atlantic City, July 16, 1919.)

### ORAL FOCI OF INFECTION ASSOCIATED WITH OTHER FOCI.

SHOULD all "dead" teeth be extracted?

Should "dead" teeth be treated to eliminate systemic infections?

To what extent is the system affected by infections in and about the mouth?

These three questions have been given great prominence in dental and medical circles recently and are leading us to new findings regarding focal infection and the part we play as mouth specialists in guarding human health and life.

I wish to say something about the method of procedure when a patient is referred to the dentist by the physician after the physician has treated the case. He may say the cause of the ailment is the teeth, and that he has treated the patient for other things and got no result. This is the way we so often have these cases referred to us, and now what are we going to do with them?

The first thing of course is a thorough examination of the tissues of the mouth. Are they healthy and are the teeth in good condition? What are the systemic symptoms, obscure pains, gastro-intestinal disturbances, etc.? Has a full blood examination been made, has a urine analysis been made and what did it show? The next step is a full radiographic dental series and in addition to this the accessory sinuses should be radiographed. May I say here that I do not believe our radiographs lie, as so many men claim, but that our technique or our ability to interpret our X-ray findings is at fault.

We find from our dental series that there are rarefied areas of bone, canals not properly filled, pyorrhea pockets that were unsuspected when our preliminary examination was made, distinct abscessed areas or larger areas of necrosis, bone changes that are not normal, cystic formations and a great many other things of abnormal appearance.

The patient has been sent to us, remember, for a systemic condition that may be obscure, perhaps a well-defined case of arthritis, heart disease of one or more of the different forms, neuritis, kidney, gastro-intestinal or almost any disease to which the human body is heir.

Can we now say to the patient that we have found infection in the mouth and that it should be eliminated and when eliminated *will result in a cure*? This is what the patient insists on knowing before giving consent to the elimination of the suspected focus. Is he going to have apparently good teeth removed when they have never caused pain and have always been very serviceable? We show radiographs of the suspected areas, but even this is not convincing because he knows of another person who followed advice for the removal of teeth or the opening of a sinus and derived no benefit whatever. Must our answer be that the radiographs show infection, and on general principles it should be eliminated, and that after two or three months if the systemic symptoms are still present it would be well to look elsewhere for the cause of the trouble?

We might also say that if the teeth are involved the worst ones could be removed and have the rest treated or have



them all treated and then, if the systemic symptoms failed to disappear, have them extracted. Or if the radiographs showed a satisfactory clearing up of the infection after treatment, a regeneration of bone, a diminution in the size of the granuloma or a perfectly filled root-canal, can we say the systemic condition is from another cause and cannot come from the teeth? All of this is very unsatisfactory. We know it and some patients will find it out sooner or later.

Now we must consider the effect of the foci of infection, that we have just been talking about, on the general system. Whether the infection comes from the teeth, accessory sinuses, tonsils or what not it makes very little difference. The effect remains practically the same.

The blood and lymphatic circulations we believe are the carriers of the causes of systemic disturbances from focal infection. The bacteria themselves are formed in the focus and here they grow, reproduce themselves, assimilate food in order to live, and excrete what we term toxins. These toxins are taken up by the blood stream and immediately the natural forces of nature are called into play to counteract, to neutralize, these toxins. This is very satisfactorily done for a time. The time may be short or may extend over a period of years. This we cannot tell, as it depends upon the virulence of the bacteria, the condition of the patient, his mode of living, his diet, the amount of exercise and sleep, and various other factors too numerous to mention, and a good many that I believe we are not aware of at present.

The toxins, but not the bacteria, are present in the blood stream. If the bacteria were coursing through the circulation and propagating there we would have a true bacteremia, and death would ensue within hours instead of weeks or years as it does in toxemia. Therefore we have only toxemia to deal with in the majority of our cases. If there are other foci of infection in the body we will still have toxemia, but the toxins may be of a different nature according to the nature of the different bacteria. For instance, one may find tooth infec-

tion that produces streptococcus, and a venereal infection that produces gonococcus, and while these germs are not in the blood stream their toxins are. Hence we have toxemia and so-called systemic infection.

Let us for example take a case of tuberculosis and tooth infection together, where we know that the resultant toxemia is due to the toxins of two types of bacteria. The case is being treated for pulmonary tuberculosis and the tooth infection is ignored, and we do not get results because something is being overlooked.

When diphtheria bacillus is grown alone in the laboratory it produces a definite amount of toxin, and when streptococcus is grown alone there is also a definite amount of toxin produced, but when diphtheria bacillus and streptococcus are grown together the production of their toxins is increased above normal. Therefore tubercle bacillus and streptococcus, gonococcus and streptococcus, or several foci of different bacteria being present in an individual at the same time may be a big factor in the diagnosis, treatment and prognosis of disease. When we have some other infection of the body and a streptococcus infection accompanying it, whether it be from teeth, tonsils, accessory sinuses or elsewhere our prognosis will not be as favorable and the case will not clear up as it would if the streptococcus were removed as early as possible or if it were not present at all.

We know of the high death rate of the recent epidemic of influenza and the resultant pneumonia. In these cases of septic pneumonia streptococcus is generally found. Have these patients a focus of streptococcus somewhere in their bodies? Is it around the teeth possibly? And would the great number of deaths have occurred, and would the pneumonia have developed a septic type, if the patients had not had this focus of streptococcus that has been present possibly for years and never caused any serious disturbances? There was only a toxemia that the system was successfully combating until the acute infection of influenza



manifested itself. The general tone of the system being lowered the streptococcus helped the other bacteria and the other bacteria helped the streptococcus and death ensued in several days.

*The Journal of Infectious Diseases* for July gives some very interesting data on this subject. Howell and Anderson of the United States Public Health Service at Chicago give a report that in brief is as follows: Blood cultures on influenza patients show that 78 were negative, 3 showed hemolytic streptococcus, 6 pneumococcus and 3 bacillus influenza. In no case did the influenza bacillus appear after the other bacteria predominated. In no case when the influenza bacillus was found in pure culture did a patient die.

The complement fixation in influenza shows that the outstanding feature of this work with influenza serum is the large number of positive results with certain strains of the viridans group of streptococci isolated from cases of influenza at Camp Meade and in Chicago. The evidence indicates that such organisms probably played an important part in the morbid process even in other places. Serum from influenza patients in several different places appears to have acquired similar new properties. Personally in the epidemic of influenza I have cases on record where the strains of streptococcus that were used in a serum were obtained from extracted teeth, and results were perfect as far as our limited clientèle would permit.

I think that the preceding has answered in a degree the manner in which the system may be affected by infection in and about the mouth.

We are still groping around in the dark, asking questions and hoping against hope that, when we eliminate the suspected infection by extracting or treating suspected teeth, removing suspected tonsils or treating the accessory sinuses, our systemic symptoms will disappear. If we obtain a good result we are lucky, if some improvement is accomplished we are almost as lucky, but if there is no improvement in the patient's condition we will certainly be

condemned and the patient discouraged.

There is a method of examining the blood that will help us to clear the question of the cause of the patient's condition. We must keep in mind the necessity of using all other means of diagnosis at the same time. You are no doubt familiar with the Wassermann test for syphilis. There is also a similar test used for typhoid and similar tests for other suspected infections. The complement fixation test is the one I have in mind.

#### THE COMPLEMENT FIXATION TEST.

This test as generally accepted in the past was not very satisfactory and could not be depended upon, but I have reference to a modification which is reasonably reliable as a help in diagnosis.

This test must be made by a trained pathologist who is familiar with this modification and who believes in it. Noguchi, Richards and Hastings are among the few men who are doing this work and are getting results.

When a physician sends me a patient suffering from some systemic disturbance it is because the teeth are suspected. The case has probably been in the hands of one or more physicians and as a general rule the cause is obscure or the case is a stubborn one that does not respond to treatment and does not clear up readily.

First, I make an examination of the mouth, teeth and accessory sinuses both radiographically and otherwise, then I insist on a full blood examination.

Be it granted that I find a suspected source of infection that comes under my jurisdiction can I say this must be removed or treated and that a cure will result? If a full blood examination is made this question can be answered with more certainty.

To have a complete blood examination made it is necessary to obtain 6 or 8 cc. of blood. This is procured by the usual method of puncturing the median basilic vein of the arm with a large caliber needle. The complete technique can be obtained from any textbook on bac-

teriology. The examination will give me a Wassermann, complement fixation for colon bacillus, gonococcus, streptococcus, tubercle bacillus, staphylococcus, catarhalis, etc. It will also give me a blood culture. The blood count, which is also necessary, is taken by pricking the finger or ear in the usual manner. With all of this data I have something to work with and can give a diagnosis or information leading to a diagnosis.

#### CASE REPORTS.

CASE A. Female. Suffering from arthritis deformans. Confined to bed for over one and one-half years. Radiographs showed tooth infection. The Wassermann was negative. The complement fixation gave a 4 plus streptococcus and a 3 plus gonococcus. Just think what it would have meant to extract the teeth and obtain no result, no improvement. That is just exactly what I would have done if I had not examined the blood. Later, another practitioner might have hit upon the remaining cause of the trouble and then after treatment the case would have cleared up. The dentist would be severely criticized for doing an unnecessary operation, when in reality a part of the cure by elimination of one of the foci of infection was due to the elimination of the streptococcus infection and consequently the elimination of its toxins from the blood. This case entirely cleared up after both infections had been eliminated.

CASE B. Male, thirty-eight years old. For four years had been in poor health. During this time he had several attacks of boils on his back and neck. He had been from one physician to another and had used every means of diagnosis that presented itself. The urine analysis showed a very small percentage of sugar and finally he was informed that he had diabetes. The teeth were suspected as a possible cause. The condition of the patient was so grave that I am sure any one of us would have extracted any or all of the teeth on general principles. The radiographic examination of the teeth was negative. The blood showed that there was a positive colon bacillus reaction when a complement fixation test was made. Wassermann and every other test was negative. The fact was established that there was no streptococcus infection. The teeth were eliminated. The radiographic gastro-intestinal series showed a complete gastroptosis. A floating kidney was found and stone in the bladder was later demon-

strated. Just think of removing teeth in this case with or without radiographs!

This patient became entirely well and has remained so for two years.

CASE C. Female, about twenty-eight years of age. Had been ill for six or seven years. The teeth had been suspected from the first. The patient had been under almost constant medical and dental treatment for the entire period of her illness. Then the appendix was removed. The old symptoms of hysteria, neuritis, and neuralgic pains still prevailed. Impacted third molars were removed from the lower jaw; and finally a mental condition was decided on as the probable cause. The case was referred to me. The complement fixation showed a Wassermann 4 plus, gonococcus 3 plus, streptococcus 4 plus, and 2 plus staphylococcus and catarhalis. The case was sent to me for dental treatment. The treatment or extraction of the infected teeth would not have effected a cure, but the extraction of the infected teeth, curetment of the infected areas, and the elimination of all dental infections was certainly a part of the treatment. This patient has improved and is well.

CASE D. Male, about thirty years of age. Had a severe heart affection. The patient had been a Marathon runner and was at the time a trainer in one of our largest universities. The case was first diagnosed as a condition resulting from over-exercise. A complement fixation showed a streptococcus reaction. The other tests were negative. The dental radiographic series showed infection. A negative complement fixation was obtained within forty-eight hours after the elimination of the focus of infection. The patient fully recovered and shortly afterward passed an examination for life insurance. Later on when war was declared he was accepted in the aviation corps, but during the final tests for "off the ground" service he had a recurrence of his former symptoms. There was found to be a return of the streptococcus infection. The tonsils were found to be diseased and were removed. The patient fully recovered and was accepted for flying.

CASE E. Male, seventy-four years of age. Suffering from a heart affection, gastro-intestinal disturbance, and a general condition of old age. The blood showed a streptococcus reaction to complement fixation, other tests being negative. The radiographs showed infection about the teeth. Upon removal of the focus of infection the blood showed a negative reaction to streptococcus in twenty-four hours.

This was a complicated case that also showed a gastropotosis. The stomach and intestines were down below their normal position in the abdomen and did not functionate properly. After treatment for this condition improvement was very marked. This was about eight months ago. I saw the patient very recently and he has been cured. One interesting point in this case is that his blood pressure, which was in the condition that is found in old men, was almost down to normal.

Here I want to give expression to another thought. Was the tooth infection primary and did the toxemia resulting so lower the general tone of the whole system that the gastro-intestinal condition was the result, or was the toxemia due to the gastro-intestinal condition primarily and did this so lower the resistance of the tissues around devitalized teeth that they became readily susceptible to infection?

In conclusion, can we safely treat infected teeth to eliminate systemic infection? Yes, providing that after treatment we can show a negative complement fixation of the blood after first having demonstrated that the infection was originally from this source, followed by a disappearance of the systemic symp-

toms. Perfectly filled root-canals are not immune to infection, and if any "dead" tooth is present where there is systemic infection it must be regarded with suspicion. What difference does it make whether the tooth or sinus infection is primary or whether some other systemic condition is primary if it is necessary to eliminate all sources of infection to effect a cure? Of course if "dead" teeth are going to become infected and continue to do so and if our patients are going to continue to be infected from this source we cannot safely retain "dead" teeth, whether they are a primary or secondary source of infection.

There is no reason why root-canals cannot be treated, why teeth cannot be devitalized *providing they will never cause infection*. If infected teeth are treated with a view to eliminating infection we must be able to show that the toxemia, if it is in the blood, has been eliminated and that no toxemia will be a result thereof.

200 W. RIDGEWOOD AVE.

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[See also *Discussion*, as reported under "Proceedings of Societies," this issue.]



## Surgical Restoration of War-injured Faces and Jaws.

By GEO. V. I. BROWN, M.D., D.D.S., F.A.C.S., Lt.-Col. M. R. C., U. S. Army,  
Milwaukee, Wis.

(Read before the Dental Society of the State of New York, Syracuse, May 15, 1919.)

IT is difficult to discuss in a definite way the subject of the surgical restoration of war-injured faces and jaws at this time when the work of reconstructive surgical operative treatment of the deformed and disfigured faces of returned war-injured soldiers in this country has been so recently undertaken, that in many cases positive prognostication as to the result of these restorative measures would be unwarranted.

### EFFICIENT EARLY TREATMENT IN WAR ZONE HOSPITALS.

The operations performed by the maxillo-facial surgeons overseas through the co-operative combination of surgeons and dentists working together have astonished the world. None, I am sure, can value more highly the benefits of these accomplishments than those of us who have had an opportunity in this country to take charge of these cases upon their return to the hospitals in which head surgery cases were grouped. It was a liberal education for both members of the Dental Corps and the maxillo-facial surgeons to be able to observe hundreds of men, the gun-shot wounds of whose jaws and faces had received more or less different treatment during the earlier stages at the various war hospitals. It was my privilege to see them at the Cape May General Hospital, where all maxillo-facial cases were sent for a time, and later as chief of the maxillo-facial service at the Walter Reed Hospital, Takoma Park, Washington, D. C., when that was designated as one of three hospitals in

this country for these cases. An attempt at the recital of the details of individual operations would be beyond the possibilities and necessary time limitations of a single paper, but there are certain broad principles the importance of which so impressed themselves upon our minds that every effort ought to be made to encourage their free discussion, especially by returned medical and dental officers from overseas service, whose judgment must necessarily take first place in the determination of final conclusions.

### CLASSIFICATION ACCORDING TO IMPOR- TANT PRESENT CONSIDERATIONS.

Two distinct divisions must be recognized in undertaking the description of these cases. First, the surgical repair of wounded parts as conducted in the overseas hospitals and the effect of this treatment upon future restorative possibilities. Second, the final surgical reconstructive treatment as now being conducted in the more permanent hospitals of this and other countries.

It is with the second division that we are chiefly concerned at this time, because of the almost infinite variety of physical defects resulting from war wounds for which returned soldiers require treatment at the present time, and will continue to do so both in army and civilian hospitals until the utmost benefit that may be possible in each case has been accomplished. It must, nevertheless, be borne in mind, that it was the early treatment which laid the foundation for later plastic surgical improve-

ment. Failure or success on the part of the dentist or surgeon in an effort to control conditions as they existed soon after injury, in most cases determined the degree of functional and cosmetic restoration that was possible in the final or at least the later treatment of these cases. The fact that practically all these men were found to be in condition which permitted great improvement by plastic operations was in itself the highest possible tribute to the skill of those who had been in charge of the overseas hospitals.

#### THE TYPES OF FACE AND JAW CONDITIONS PRESENTED BY SOLDIERS RETURNED TO THIS COUNTRY.

In a general way the following classification may be used to describe the defects which present for maxillo-facial treatment in the U. S. Army Hospitals.

1. *Soft Tissue Defects.* (a) Scars that are unsightly, but which do not noticeably cause deformity of the surrounding parts.

(b) Scars that deform surrounding tissue but are not directly adherent to bone.

(c) Scar contractions adherent to bone surfaces causing deep depressions and the malfixation of muscular attachments.

(d) Loss of tissue, leaving surfaces to be restored by the transposition or transplantation of tissue from adjacent or distant parts.

2. *Special Injuries.* (a) Salivary fistulae following the repair of wounds involving the salivary glands or their ducts or both glands and ducts.

(b) Nasal and orbital defects through partial or complete destruction of these organs and from injuries to bone or the soft parts such as the eyelids, the nasal cartilages, etc.

3. *Injuries Affecting the Bones of the Face and Jaws.* (a) Ununited fractures in which a pseudarthrosis has become established because of continued septic conditions, the interposition of tissue

between the bone ends, incomplete immobility, or other disadvantageous factors but in which direct contact of the bone ends is practicable.

(b) Cases in which there has been loss of sufficient bone to require bone grafts for restoration.

(c) Deformities caused by the malposition of fractured bones, the loss of bone structure, the malformation or displacement of bones by traumatic injury without actual fracture, and the effect of these conditions on overlying or associated muscular and other tissues.

(d) Partial or complete ankylosis or other chronic disturbances at the temporo-mandibular articulation due to injuries of the joint.

(e) Fibrous bands of tissue limiting jaw movement in various situations between the jaws.

(f) Malocclusion of the teeth and displacement of the jaw fragments by perverted muscular control without the restraint of opposing muscular activity through lost jaw attachments.

4. *Foreign Bodies and Sequestra of Bone.* (a) Cases in which septic or other pathologic conditions required their removal.

(b) Without indications of undue irritation or aseptis.

#### NECESSARY DISTINCTIONS IN TREATMENT.

The methods of treatment required in these cases may broadly be described under two widely applicable distinctions:

1. Those in which immediate correction may be accomplished by uniting adjacent bone or soft tissue surfaces.

2. Those in which by reason of lost tissue and the unfavorable condition of the surrounding parts, it has become necessary to transpose or transplant similar or at least favorable structures or by artificial means to supply a substitute for the lost parts, either to restore function or to improve cosmetic appearances, or both.

Under these two heads may be included practically all of the many and

often wonderfully ingenious devices that have been applied to the surgical and mechanical restoration of war injuries and other facial disfigurements.

The first group includes bone injuries which may require simply a proper approximation of the divided surfaces and their fixation by suitable splints or wiring as may be indicated, and wounds that can be closed by direct approximation of surrounding tissue with the aid of wide undermining if necessary.

In the second division, may be included cases that require soft tissue or cartilage transplantation, bone grafting or other methods of securing the desired structures from more distant parts of the body.

#### PLASTIC OPERATIVE PROCEDURES.

The most important of these may be enumerated as flap sliding or covering the defect by making suitable lateral incisions and sliding adjoining parts into the desired position as is extensively done in the closure of cleft palates and other procedures which require similar methods of treatment.

Pedicle flaps from nearby parts twisted and laid over the denuded areas. Pedicle flaps from other parts of the body held in place until union has taken place and the pedicle divided at a later operation. Double pedicle flaps and double epithelized flaps.

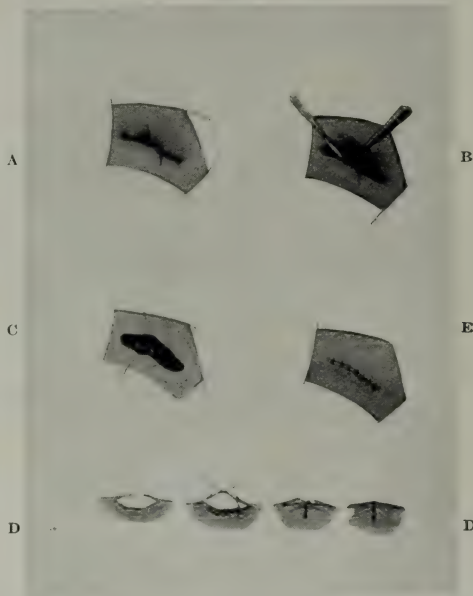
#### REMOVAL OF SCARS.

The method which the author has employed to remove depressed scars and in some cases to relieve the restrictive influences of bands of tissue upon jaw movement even when there was an almost complete ankylosis is illustrated in Figs. 1, 2 and 3.

In following this plan the scar is excised by clear-cut skin incisions just outside its line of demarcation and dissected out with care not to enter the mouth. The surrounding tissue is widely undercut to prevent adhesion and facilitate approximation of services without tension. A series of rows of

buried catgut sutures are placed to hold the parts in right relation and prevent contraction in any direction which would tend to cause recurrence of the depression. This also corrects adhesions which prevent jaw movements and is capable of wide application in the treatment of all deforming scars except when

FIG. 1.



Removal of uncomplicated depressed scar. (A) Scar surface. (B) Excision of scar tissue. (C) Shows outline of undercutting of tissue required in such cases. (D) A profile view showing the adjustment of underlying tissues and their fixation by buried catgut sutures to prevent recurrence of the defect. (E) Skin surface closed.

transplants may be required to give more complete restoration. Figs. 4 and 5 show results of this treatment.

#### THE RESTORATION OF ORGANS OR PARTS THAT HAVE BEEN COMPLETELY OR PARTIALLY OBLITERATED.

Any one of the many plastic operative methods may be required, such as grafts, direct and indirect transplants, and the use of both cartilage and skin in an al-



most infinite variety of ways to reconstruct, in the course of step operations, suitable substitutes for the lost parts. In the beginning it was believed that face masks would have to be quite generally used, but so much has been done in a surgical way that these aids are seldom required for permanent wearing.

FIG. 2.

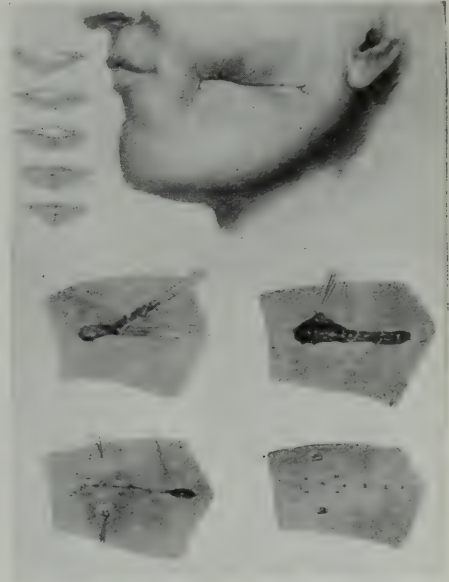


Deeply depressed cheek scar treated as illustrated in Fig. 1 and showing application of the silver button tension sutures laid over adhesive plaster to prevent skin cutting.

The Indian operation of taking a flap from the center of the forehead to supply tissue for a lost nose has been more or less successfully employed; as has also the Italian method of raising a pedicled flap from the arm and binding it close to the face for a sufficient period to allow union to be completed, after which the base of the flap is severed from the arm and a nose fashioned from the mass thus secured in the course of subsequent operations. A finger or a toe has been transplanted in some cases to form the base of a new nose. Both the Indian

and the Italian methods have been modified for this purpose by the transplantation of rib cartilage to the site from which the tissue flap is to be made and, later, after it has become firmly embedded and attached to its surrounding tissues, the whole mass is turned in to form a nose, the pedicle being allowed

FIG. 3.



The operative step in the treatment of a deforming scar, such as is illustrated in Fig. 4.

to remain attached until sufficient union has taken place to insure blood circulation after the pedicle has been severed. This has been found to be an efficient improvement on the old methods and very perfect results have been secured by Major Gillies of Sidcup, England, and his followers in this country.

The *fascia lata* from the external surface of the thigh has played a very important part in situations where adhesion to bone surfaces has caused disfiguring or otherwise distressing deformity. When *fascia* is properly placed and the overlying tissues firmly united the tendency to draw down to the old adhesion

is relieved and free muscular action favored.

Fat makes a good transplant to fill out depressed surfaces if infection be scrupulously avoided, but its susceptibility in this direction renders it somewhat less desirable than fascia or cartilage although in every transplant, as in every graft, the most scrupulous asepsis is

erable for many reasons, but there are cases in which a Wolff graft properly placed is desirable because, notwithstanding the discouraging tendency to turn dark and the later desquamation that so often results when these grafts are used, it nevertheless usually provides a good foundation for future work if required in that situation. The Cole

FIG. 4.



Depressed scar, which not only deformed the surrounding muscles and destroyed the outline of the face, but also caused almost complete fixation of the lower jaw.

FIG. 5.



The same man after excision of the scar as illustrated in Fig. 3, by which the outline of the face was restored and the patient enabled to open and close his mouth with freedom.

required for success. Figs. 6 and 7 show the effect of cartilage transplantation.

The possibilities of skin grafting have been greatly extended. Thiersch grafts (epidermal grafts) and the dermal-epidermal graft, also called Wolff graft, containing all the layers of the skin, have served many useful purposes.

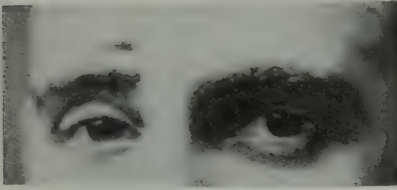
It seems fairly well settled that, for large surfaces and when it is not expected that a second operation will be required in the same situation, the Thiersch grafts are undoubtedly pref-

method of rolling an epidermal skin graft around a stent made of dentists' modeling compound of suitable size and shape, with the outer surface of the skin next to the modeling compound and the raw surface on the outside, burying this in the tissues and closing the wound over it, has been useful in a great variety of ways. This procedure is particularly suitable for such situations as the mouth and orbit where an incision along the inner surface will permit the removal of the stent and expose the skin lining

surface which has been secured by the aid of the graft.

ment that may be required; for example: The loss of a portion of the horizontal

FIG. 6.



Shrapnel wound which destroyed the external wall of the right frontal sinus and left a deep disfiguring scar.

FIG. 7.



Same case shown in Fig. 6, after the insertion of a rib cartilage transplant and closure of the overlying tissues.

#### CASES IN WHICH A PORTION OF THE MANDIBLE HAS BEEN DESTROYED.

There has been much discussion and considerable diversity of opinion ex-

body of the mandible close to the ramus presents the alternative of forcing the fragments apart in order to bring the teeth into normal occlusion, in which case, only a fibrous union must result,

FIG. 8.



A



B



C



D



E

(A) and (B) Flanged splints to correct jaw alignment. (C) Splints on both jaws with ligatures to hold mouth closed. (D) and (E) Flanged splint permitting only partial closure of the jaws.

pressed with regard to certain principles, the observation of which must determine the course of action at the time of injury, and upon this decision depends in large measure the subsequent corrective treat-

and a bone graft would then be required later on unless a permanent prosthetic appliance is worn continuously, or the drawing forward of the ramus to permit of its being attached to the end of the

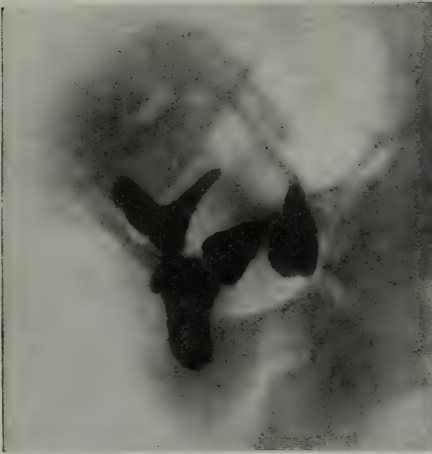


remaining jaw without regard for the disarrangement of the occlusion of the teeth.

Both of these methods have been strongly advocated, and both have been quite extensively employed. Basing judgment on the results, as shown by many cases treated by both methods in the overseas hospitals that came under our observation after their return, it appears to be safe to conclude that each of these methods of treatment has its

ward to meet the difficulties of the situation in an almost unbelievable degree, and if allowed to slide by on the outside of the upper jaw, so that its anterior border does not meet the tuberosity of the maxilla in closing the mouth thus preventing complete closure, a very considerable readjustment becomes possible and the disadvantages of disarranged tooth occlusion are correspondingly mitigated. On the other hand, in cases such as that shown in the moving-picture

FIG. 9.



A



B

One of the author's cases grafted according to the Albee method with a complete tibial bone graft. (A) Shows case before bone graft was inserted. (December 1, 1918.) (B) Shows case after insertion of bone graft. (January 15, 1919.)

advantages, and both have disadvantages which should be avoided as much as possible. Fig. 8 illustrates splints to correct jaw alignment in such cases as they came to us from overseas. Even though there may be considerable disarrangement of the occlusion of the opposite sides of the jaw when the remaining portion of the body of the mandible is brought into contact with and sutured to the ramus, the advantage of immediate healing and consequent relief for the patient, which this procedure makes possible, is one of no little importance. As a matter of fact the ramus comes for-

ward to meet the difficulties of the situation in an almost unbelievable degree, and if allowed to slide by on the outside of the upper jaw, so that its anterior border does not meet the tuberosity of the maxilla in closing the mouth thus preventing complete closure, a very considerable readjustment becomes possible and the disadvantages of disarranged tooth occlusion are correspondingly mitigated. On the other hand, in cases such as that shown in the moving-picture

\* The moving picture was shown through the courtesy of the Army Medical Museum, and was prepared under the direction of the essayist while in active army service.

months of unnecessary discomfort during which the fractured bone ends were drawn inward and turned in such malposition by the loss of the counteracting

The Albee method of placing a tibial graft, containing the periosteum and the full thickness of the bone, in dovetails cut into the mandibular bone ends at

Fig. 10.



Pseudarthrosis at the symphysis of the lower jaw of long standing. In this case there was also a congenital fibrous band extending from the jaw to the clavicle, causing deformity shown and rendering it impossible to hold the head comfortably in an upright position. The divided jaw was fixed with a splint attached to the teeth.

muscular control, that there was constant irritation of his tongue, and as this condition became worse through scar contraction there was almost no space left for his tongue except with his jaw hanging and mouth half open. Constant drooling of saliva was in itself a serious annoyance.

#### BONE GRAFTS.

The war has certainly taught us that contrary to expectation the mandible is quite favorable to successful grafting provided the disadvantages of mobility and infection can be overcome. Absolute fixation with a suitable splint and care not to enter the cavity of the mouth when exposing the bone surfaces gives protection against these disadvantages.

Fig. 11.



Same young woman as shown in Fig. 9, after the insertion of an osteo-periosteal bone graft. A shaving from the tibia placed with the periosteum faced outward and the bone inward on the inside of the jaw, a second thin osteal graft placed with the periosteum inward and the periosteum sutured to the mandibular periosteum according to the method advocated by Le Maitre, after which the overlying tissues were closed in such manner as to remove the depressed scar. The neck is also shown after correction of the defect by a transverse incision at a point just above the thyroid cartilage through the fibrous band and after freeing the surrounding tissue the skin was drawn from the central portion of the incision above and below upward and downward until when brought together the line of incision was perpendicular instead of parallel. A slight trimming of the skin at each end of the suture line was necessary in order to complete the outline of the neck.

each side of the space to be filled with the graft and securing it with ligatures of kangaroo tendon passed through holes in both mandibular bone ends, has been widely used and in the author's experience has been quite uniformly success-

ful. (Fig. 9.) Albee's method of utilizing a section from the crest of the

Maitre and others, have an established place in bone reconstruction work. These are prepared by cutting the out-

FIG. 12.



Shows a man with saddle nose.

ileum is also advantageous, particularly so when a curved graft is required.

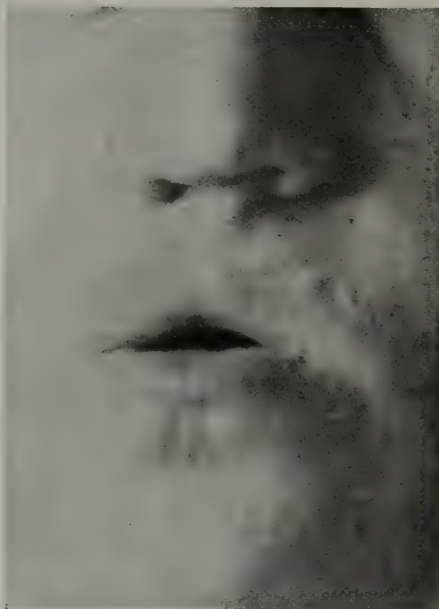
FIG. 13.



Photograph of the same case after the insertion of a bone and cartilage graft taken from a rib and inserted from the inside of the nose without external scar.

The osteo-periosteal bone grafts, according to the plan recommended by Le

FIG. 14.



Deformed nose and scarred lip.

FIG. 15.



After excision of the lip scar, adjustment of the outline of the mouth, correction of the nasal alæ, the insertion of a rib cartilage transplant on the right side of the tip of the nose, reproducing its normal outline.

line of the graft on the periosteum of the tibia with a bone shaving of the outer surface of the bone attached to it but



slightly smaller than its periosteal covering. Two of these osteo-periosteal grafts are placed one with the periosteum inside and the bone facing the outer surface, and the other with the periosteum on the outside and the bone surfaces inward. A third graft similarly cut is sometimes placed between them. The overlapping periosteal borders are sutured to the mandibular periosteum. (Figs. 10 and 11.)

It is impossible to do more than make brief reference to the most commonly useful procedures employed in the surgical reconstruction of war-injured faces and jaws, but even a cursory description of them is important, because the general distribution of information, which will give wide familiarity with the essential features of these operations and the possibilities of accomplishment in this direction, is demanded in order that the utmost benefit may be reaped therefrom and passed on from military to civil cases.

The application to civil practice of the plastic surgical operative experience gained in war work, through the opportunity that it gave surgeons to perform over and over again operations that

would at best have been unusual in private practice, and the observation of many of these results instead of an occasional one, has already resulted in much work being undertaken with benefit to private patients that would formerly have been unthought of. It must follow as night the day, that correction of facial defects and deformities will take on an entirely new aspect in the near future, and much will be possible for these cases that was formerly undreamed of in our practices. Figs. 10, 12, and 14 illustrate some private cases in which grafts and transplants were successfully applied.

It goes without saying that the mutual respect engendered by the conjoined efforts of surgeons and dentists and the magnificent results that they have attained together, but which neither could have done so well alone, ought to carry on for all future time the practice of continued co-operation as one of the inestimable benefits to accrue from the great sacrifices of war-stricken people.

445 MILWAUKEE ST.

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[See also *Discussion*, as reported under "Proceedings of Societies," this issue.]

## Dental Service in the United States Army During the World War.

By WM. H. G. LOGAN, M.D., D.D.S., Chicago, Ill.

(Read before the annual meeting of the Dental Society of the State of New York, held at Syracuse, May 13-15, 1919.)

**A**N effort will be made to convey something of the spirit and manner in which the members of the dental profession of the United States sought to do their duty as dental officers and professional men during the recent war emergency, and the subject will be discussed under three heads:

1. The status of the dental service in the United States Army on April 8, 1917.

2. The status of the dental service in the United States Army on November 11, 1918 and on February 12, 1919.

3. What are the plans, ambitions and ideals the dental service of the United States Army is justified in hoping will be transformed into a reality in the immediate future?

### STATUS OF THE U. S. ARMY DENTAL CORPS AT THE OUTBREAK OF THE WAR.

A consideration of the status of the dental service in the United States Army on April 8, 1917, is essential to ascertain what progress has been made in this arm of the service; for on that day our Commander-in-Chief, President Woodrow Wilson, appeared before a joint session of Congress assembled and declared that a state of war existed between this country and the Imperial Government of Germany.

At that time the records showed the American Army had eighty-six dental officers, eighteen of whom were captains and the remainder first lieutenants. Al-

though our dental law permitted dental officers to advance to the grade of major, this was possible only after such officers had a record of twenty-four years of service, and then the number was limited to eight regardless of how many there might be who had served the required twenty-four years.

In spite of the fact that it was customary to have the officers of most branches of the military service receive special military and technical or professional training immediately upon their entrance to the army, this opportunity had never been granted the members of the Dental Corps previous to the declaration of war. A law existed at that time permitting the creation of a Dental Reserve Corps, yet no rules nor regulations had been promulgated to organize such a corps until after we entered the war. While many dentists were eager to enter the Dental Reserve Corps, the early plan pursued made it necessary for an applicant to forward his request to the Surgeon General's office. The formal application was then furnished and the applicant advised when the next board was to meet in his own state or in an adjacent one, with the result that many days or weeks would elapse from the time the applicant applied until his completed papers arrived for final decision. To prevent this delay, if possible, I presented to those in authority in the Surgeon General's office on June 1, 1917, the plan whereby I was permitted to select representative men of the dental profession

who by education and experience were well qualified to give professional examinations to applicants desiring to be commissioned in the Dental Reserve Corps. This request, although most unusual, was accepted the following day by Surgeon General Gorgas.

On the day intervening between the presentation and acceptance of the plan whereby preliminary dental examiners were to be officially appointed by the War Department, appropriate examiners were selected for each state, that no delay would be occasioned if final acceptance were secured. The men so selected were approved by the Surgeon General as preliminary dental examiners and were the deans of the well-recognized dental institutions, the secretary of each State Dental Examining Board and such dentists in addition as the service demanded.

It is of interest to record that the dental service of the United States Army is the only arm of the military organization which was built up through the aid of the preliminary examiners. All examiners gave liberally of their time gratuitously to assist dentists desiring to enter military service. This was done with such promptness that we find, although but five Reserve Corps officers were commissioned in the first two months of the war, by September 18, 1917, or three and one-half months subsequent to the authority for appointment of the preliminary examiners, all examinations for general practitioners were discontinued, as the War Department had a sufficient number of commissioned dental officers and completed applications on file for action to care for an army of five million men under the quota then authorized by law. Therefore, through the compliance with every request issued in the name of the Surgeon General, the dental profession was able to accomplish that which was not equaled by any other branch of the military organization—securing its quota of officers for a five million army in practically three and one-half months. These officers were secured without the holding of a single public meeting, without the presentation of a personal appeal by letter or voice of any one in

this nation; and in this accomplishment the dental profession established a record of which it may be justly proud.

At the time war was declared, those having charge of the construction of the camps and cantonments of this country arranged to have the dental service performed in the camps under canvas and in the cantonments in the regimental infirmaries. In both instances the dental equipment was the field outfit, made up, as most of you know, of a portable knock-down canvas seat chair, an old style cuspidor, a foot engine and no laboratory equipment except in the hospitals where one base equipment was supplied.

#### STATUS OF THE DENTAL CORPS AT THE CLOSE OF THE WAR.

Having outlined the status of the dental service when war was declared and the dental force planned and built to meet the requirements authorized by law for an army of five million, let us now focus our attention on the status of the dental service as it existed when the armistice was signed.

For the purpose of making the situation plain on this historic day, it is necessary that we pass back to September 30, 1918, for it was on that date the Adjutant General by regulation granted an increase in the quota of assignment of dental officers from one to two per thousand. The object of this was to provide for the 4,500,000 army this nation was to have in the field by July 1, 1919, between nine and ten thousand dental officers.

As most of you recall, efforts had been made since dentists sought entrance as officers in the United States Army, to have the quota of two per thousand authorized by law, but without avail, and here we find by authorization of the General Staff the granting of that which we had all sought so long. Why was it possible at that time to secure the authorization for assigning two officers per thousand? It was because our civilian dentists banded themselves together to assist in making the selective service man dentally fit through the activity of



that splendid patriotic organization the Preparedness League of American Dentists previous to his induction into military service; and because dentistry in the posts, training camps and hospitals of this country, the base and evacuating hospitals, field service and far forward in the line had been tried and not found wanting, and the service of the dental officers had been proved worthy of every consideration. Therefore, the request for the authorization for doubling the quota was approved.

Yes, the authorization for the assignment of two dental officers per thousand was secured as of date of September 30, 1918, and on October 3d authorization was granted in every camp in this country and abroad for enlisted dentists to complete applications for commission. A few days later authorization was granted to dentists who had been placed in Class 1-A by their Local Board to complete applications for commission in the Dental Corps of the United States Army. Between the 3d day of October and the 11th of November, 1918, 1500 applications were completed and forwarded to the Surgeon General's office. Between eight and nine hundred of these had been acted upon by the Surgeon General and recommended to the Adjutant General for commission. Of the eight or nine hundred applications recommended to the Adjutant General only about one hundred were granted commissions. Because of the signing of the armistice an increased number of dental officers was not needed, as we had a reserve of 1500 still unassigned.

I outlined in the opening statement and described where the dental officer performed his duties and referred to his equipment during the early days of war. Let us now consider the same two factors as of date of November 11, 1918. Instead of eighty-six dental officers on duty, we had in round numbers about five thousand: three thousand in this country and a little less than two thousand abroad. In this country at all camps and cantonments two dentists per thousand were at work in specially constructed dental infirmaries which accommodated

from twenty to thirty dental equipments composed of the usual base chair, with which you are all familiar, fountain cuspidor, electrically driven dental engine, steel cabinets, electrically heated spray outfit, complete laboratory equipment, a splendid radiographic outfit and a dark room for developing films—a more complete dental equipment than is possessed by many splendid civilian dental practitioners.

The dental officers abroad had but few base equipments and in the main had to rely upon the field equipments, as the question of weight and space had to be considered when shipping equipments overseas.

Believing that a comprehensive understanding of the dental situation in the United States Army on the date of signing the armistice is not possible without a review of three additional points, your attention is now invited to the professional educational activities instituted for the purpose of making our dental officers more efficient immediately upon entering service; second, the including of dentists in the surgical head units; and, finally, the beneficial influence that resulted from the legal enactment that gave advanced rank to dental officers and similar treatment of dental students by law as previously allowed medical students by regulation as the result of an order issued by the Provost Marshal General.

In May and June 1917, a majority of the dental schools of this country instituted gratuitous courses of special instruction for applicants desiring to enroll in the Dental Reserve Corps. The course was approved by the Surgeon General and was of such a nature as to fit those in attendance for better officers in field and hospital service. It is a conservative estimate to state that between four and five thousand dentists attended these courses of instruction without expense to themselves or to the Government, and the dental educational institutions of this country have a right to feel proud of this contribution.

On October 15, 1917, by authority of the Surgeon General and under the direc-

tion of the Sub-Section of Plastic and Oral Surgery of the Surgical Head Unit, courses of instruction in plastic and oral surgery were instituted at Washington University Dental School, at St. Louis, Mo., Northwestern Dental School, Chicago, Ill., and the Thomas W. Evans Museum and Dental Institute, School of Dentistry, University of Pennsylvania, where medical and dental officers were detailed for instruction. The medical officers were given special instruction in plastic surgery, blood transfusion and bone transplantation; and the dental officers were given special instruction in bone fragment fixation by the use of intra-oral splints, the systemic effect of focal infections and surgical anatomy of the face, jaws and neck. These courses were discontinued in March 1918.

On March 15, 1918, a school for army dental officers was instituted at Camp Greenleaf, Chickamauga Park, Fort Oglethorpe, Ga., in connection with the Medical Officers' Training Camp for military and professional instruction of dental officers and their authorized assistants. When the armistice was signed 1200 dentists were in this school receiving either military or professional training.

The duration of the general course of instruction for the dental officers was two months. The first month was given over to 180 hours of general military training and the second to 70 hours of special military training, and 110 hours devoted to professional subjects having a definite relation to the general practice of dentistry as it should be conducted in the army. Each professional class consisted of from eighty to one hundred, and a small percentage were retained for training to qualify them for assignment as division dental surgeons or assistants to the division dental surgeon.

In this Officers' Training Camp we had dentists receiving training of such a nature as to greatly increase their physical and professional efficiency. Furthermore, in so far as I know, this was the only country giving such extensive training in military and profes-

sional subjects to dental officers and their authorized assistants.

On June 15, 1917, the Surgeon General approved of the organization of the section of surgery of the head which had among other duties the securing of a personnel especially qualified to care for diseases and injuries of the brain, eye, ear, nose and throat, face and jaws, and placed in charge a member of the Medical Corps, Regular Army. The commissioned personnel of the Surgical Head Unit consisted of one specialist each for the brain, eye, ear, nose, throat, one plastic or oral surgeon and one dental oral surgeon competent to care for fractures, impactions and pathologic diseases to which the teeth and jaws are subject.

It is believed by including dentists in the organization of the surgical head units, better service was given our wounded soldiers who sustained injuries of the face and jaws, than could have possibly resulted had these cases been handled without the assistance of specially trained dental officers. In addition, a splendid opportunity was given to members of our profession to increase their ability and knowledge in surgical principles involved in the management of these surgical lesions.

#### ESTABLISHMENT OF THE DENTAL CORPS ON THE SAME BASIS AS THE MEDICAL CORPS.

On October 6, 1917, a dental law was enacted by the Senate and House of Representatives in Congress assembled and approved by the President, which gave to the Dental Corps of the Regular Army the same grades and percentages within the grades then allowed or that might thereafter be allowed by law for the Medical Corps of the Regular Army.

Two important beneficial results followed this enactment. First, the allowing of advanced grades to members of the regular Dental Corps that they might perform their duties in the executive position in which they were needed to assist as camp and division dental surgeons. The second benefit is found in the fact that many young practitioners of



dentistry, who were well qualified, were attracted to the regular Dental Corps, because it assured them the same recognition for similar years of service as had been granted to members of the Medical Corps. I consider it appropriate that mention should be made of the fact that, while all members of the dental profession did what they could to bring about this law, special recognition should be given to the part taken by the President, Secretary, and Chairman of the Legislative Committee of the National Dental Association for the year 1917.

I desire to publicly express the personal opinion that had it not been for the amendment attached to this bill which specified that "all regulations concerning the enlistment of medical students in the Enlisted Reserve Corps and their continuance in their college courses while subject to call to active service shall apply similarly to dental students," the dental bill would not have been favorably considered during that session of Congress.

It was on July 18, 1917, that the deans were called to Washington to confer with the Dental Committee of the General Medical Board and discuss the enrollment of students in the Enlisted Reserve Corps of the Medical Department, permitting students to be assigned to the inactive status until the date of their graduation. It was then considered imperative and is now so held by the writer, that young men of conscription age should have been permitted to enroll in the Enlisted Reserve Corps of the Medical Department under the proper limitations, for the purpose of completing their dental education before being called for military service. At this conference, a sub-committee was appointed with power to act, and although an educational propaganda was officially carried forward by them, all of those in close touch with the subject had reached the conclusion that they had been unable to convince those in authority of the justness of their claim.

During the summer and early autumn, many dental students were called by the local boards and sent to various camps,

until October 6, 1917, when without the knowledge of any dean of the committee representing the National Dental Faculties Association, or the Legislative Committee of the National Dental Association, an amendment was attached in the Senate to the dental bill enacted on that day which specified that "all regulations concerning the enlistment of medical students in the Enlisted Reserve Corps and their continuance in their college courses while subject to call to active service shall apply similarly to dental students." I believe if the dental profession through its committee representing the Dental Faculties Association had been successful in their efforts to secure for dental students the privilege given medical students to remain in their course of instruction until graduation without legislation, that regulation probably would have been rescinded during November or December 1917 or September 1918. The reason for this is that those in authority thought additional graduates would not be needed to supply the military force. But, after a careful review of the number of dentists then practicing and the natural decrease in the annual number of graduates entering the profession as a result of increasing the course to four years, it is doubtful if there would have been sufficient dentists in the United States in three to five years from this date to care for those requiring their services if this opportunity had not been granted to young men desiring to study dentistry under the law referred to. Therefore, if I am correct in my deduction the public, the dental profession and the dental institutions of the country, as well as the dental students who were personally benefited, should commend and be grateful to Congress for their intelligent handling of this professional problem.

In concluding this phase of my subject, the opinion is expressed that, if Congress had not granted the opportunity for dental students to enlist in the Medical Enlisted Reserve Corps or the Students' Army Training Corps and be placed on the inactive list until graduation, a serious reduction in the number



of dentists required would have been one of the end results, and another would have been that the majority of dental institutions of this country would undoubtedly have closed their doors before or during the session of 1918, or soon thereafter, for they would have had only the matriculants who were physically defective or those not of conscription age, which would not in most cases have warranted the continuation of our dental institutions during the war.

#### THE FUTURE OF THE U. S. ARMY DENTAL CORPS.

Now that peace is soon to come, the temporary military organization designated as the United States Army will pass out of existence and either a peace or regular army will take its place. What of the future quota of assignment of dental officers to that peace or permanent army? Of this I can say, it was my firm conviction when I ceased military duties in the Surgeon General's office February 12, 1919, the powers that be in the Surgeon General's office, the Chief of Staff and the Secretary of War had reached the conclusion to concur in the desire of the dental profession and the Dental Corps that the assignment of two dental officers per thousand should be allowed hereafter in any army that represented the United States of America.

The authorization of two dental officers per thousand, I believe, will be written into law without the raising of a voice or hand of a member of the Dental Corps or of the dental profession at large, and as evidence that this will probably occur you are referred to the *Army and Navy Journal* of January 18, 1919, page 713. You will find there recorded the fact that Newton D. Baker, Secretary of War, and General March, Chief of Staff, appeared before the Military Committee of Congress and approved a bill for the reorganization of the army which included the quota of two dental officers per thousand.

A table of organization in detail specifying the number of dental officers with their grades to be assigned at all stations

had been approved. Furthermore, it was and is my opinion that officers of the Dental Corps will be on duty at all times in the Surgeon General's office looking after the interests of their corps under the direction of the Surgeon General and all this will continue without the request of any member of the Dental Corps or of the profession at large.

The Surgeon General fully approved the establishment of a Dental Officers' Post Graduate Training School in connection with the Army Medical School at Washington, D. C., in close proximity with the Walter Reed General Hospital. The general plans for the building were completed, the subjects to be taught were selected, the number of hours to be devoted to each arranged, the number of students to receive training in each course designated and the rank for the teachers needed for instruction approved. The number of professors and assistant professors is to be seventeen, dental officers to be detailed for each course of instruction to be one-tenth of the total number of dental officers, duration of course four and one-half months, two courses per year.

In addition to the post-graduate professional instruction given at this school, every dental officer will be required to receive two months' previous military training once every five years at Camp Greenleaf, Fort Oglethorpe, Ga., in the military section of the school. At the termination of the two months' military training, they will proceed to Washington and receive the four and one-half months' professional instruction.

I believe the most ambitious hopes for the future welfare of the Dental Corps will be realized inside of a year or two at the most. For in that period, I have faith that the quota of two per thousand will be authorized by law with the approval of the War Department—without any request of members of the dental profession that a post-graduate school will be established where all members of the Dental Corps will receive instruction once every five years for the duration of their service, that full dentistry will

be established in the army, and that complete dental equipment will be found at all permanent stations.

The only serious obstacle that may interfere with the consummation of the plans here outlined is found in the apparent reversal of opinion expressed by some of those in authority in the War Department that may result in a reduction of the percentage of officers allowed in the grades of colonel, lieutenant-colonel and major and the grade of second lieutenant added. If the Dental Corps is not permitted in the future to have the same grades and percentages within the grades as is authorized by law for the Medical Corps, the efficiency of the dental service in the United States army will to a degree deteriorate, for the best type of men will never leave civilian practice for army service in times of peace under such adverse conditions.

In concluding this paper, I desire to say that the dental profession has in a way been more than generous in its expressions of belief that I was in a measure responsible for some of the dental progress here recorded. Therefore, I desire to definitely affirm that if the cause of dentistry had not been fully appreciated by those in authority in the Surgeon General's office and by the Chairman of the General Medical Board Council of National Defense, much of

the growth of the dental service in the United States Army would either not have been accomplished or would have gone forward much more slowly. Therefore, in the future when members of our profession or others have occasion to mention the names of those largely accountable for the splendid record written in the present world war, please remember to include among the foremost the names of General W. C. Gorgas, General M. W. Ireland, General R. E. Noble, Colonel F. H. Martin, Colonel R. B. Miller and Lieutenant Colonel J. S. Coulter, for if any of these officers had been antagonistic or even indifferent to the worth and advancement of dentistry, many of the things here described could not have been recorded as accomplished. I ask that you see to it that dental historians include their names as individuals who have rendered efficient service in aiding dentistry to be developed in the army as well as along educational lines.

To these distinguished medical officers, to the dental officers and to you the civilian dentists of this nation belongs the credit for the improved status of the dental profession in the eyes of the public, the army and the medical profession.

[See also *Discussion*, as reported under "Proceedings of Societies," this issue.]

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## CORRESPONDENCE

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### "Focal Infection and Its Toxic Effect."

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TO THE EDITOR OF THE DENTAL COSMOS:

*Sir*,—At the present time we hear so much of focal infection and its systemic effect that I think it would not be out of place to cite a case which recently came under my observation.

A young lad, ten years of age, suddenly became seriously ill, complaining of severe headaches accompanied by vomiting. A physician was summoned and a careful examination was made. The patient's temperature was hovering between 102° and 104°. This high temperature continued for about ten days. All organic disturbances were excluded, patient at this time complaining of no pain of dental origin. A blood test was made, a case of typhoid having been suspected, but this proved negative.

A specialist was then summoned who, after careful examination and consultation, also diagnosed the case as suspected typhoid. Finally one of the specialists suggested that an examination of the patient's teeth be made. This was done and a broken-down canine root was observed. Upon pressure at the gum overlying the apical portion of the root, pus could be seen oozing forth.

Thereupon the offending tooth was ordered immediately removed, which having been done, resulted in a decided decrease in temperature, and two days later in the patient's return to normal health.

Respectfully yours,

B. BERNARD CHILTON, D.D.S.

NEW YORK, N. Y.

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### "Ultero-membranous Gingivitis."

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TO THE EDITOR OF THE DENTAL COSMOS:

*Sir*,—In requesting the use of the correspondence department of the DENTAL COSMOS to answer the remarks by Drs. Merritt and Feldman (DENTAL COSMOS, November 1919), on my article "Ultero-membranous Gingivitis" (DENTAL COSMOS, September 1919), I beg that you absolve me from any desire to "clutter it up" with needless words and ask you to witness the fact, that in thirty-two years, as a subscriber, this is my first and, I trust, last offense.

Every correspondent in the "agony column" thinks his is the only com-

plaint; my own lies, first, in the prime importance of this disease, which I have seen ravaging the military camps; second, in a misrepresentation, resulting from partial quotation, hardly intended, I hope, by Dr. Merritt; for, of all errors in correspondence, partial quotation is the most unfair.

Observe its workings. He partially quotes me as follows:—"The treatment of this disease (ultero-membranous gingivitis) is most decidedly not by instrumentation," and then stops. Why not the whole qualifying paragraph? In discussing the treatment of the acute stage,



I said: "The treatment of this disease is most decidedly not by instrumentation, for the reasons given. No matter how skilled the operator, the membranes will certainly be forced deeper into the underlying tissues or scattered into others, spreading the disease. At most, instruments should be used only to carefully lift the gangrenous membranes from the sub-tissues, with as little hemorrhage as possible. Sprays, under sufficient air-pressure to force the masses from the interdental spaces, are most valuable when applied frequently (every hour) by patient and operator."

Sprays, you will note, under heavy air-pressure, were only used as an expedient at this stage, because I dreaded any wound under these conditions; as Dr. Merritt agrees, quoting me, "that no wounds be made or tissue damaged during any phase of Vincent's disease." I had seen fresh ulcerations on mucous abrasions and wounds, resulting from brushes and instruments, where pharyngeal Vincent's or an angina existed; and noted the fact in my paper that it could be conveyed from an ulcerated to a healthy gingiva by using the same instrument.

Hence, I said: "It is well, therefore, to accent the precaution that no wounds be made, or tissue damaged, during any phase of Vincent's disease. The cleaning and scaling of teeth, root-canal treatment, exodontia, or any mouth surgery, is absolutely contradicted—for serious cervical cellulitis, periostitis, and gangrenous necrosis, involving the maxilla and mandible, occasionally result therefrom."

I further qualified my first statement by saying: "Only after thorough recovery, disappearance of pseudo-membranes, and repair of pockets by epithelium [abatement of the acute stage] should the very necessary instrumentation be applied for a complete mouth prophylaxis."

Why did Dr. Merritt omit this explanatory phrase?

Dr. Merritt implies that I use mouthwashes, stating quite correctly that a "Vincent's infection cannot be embalmed

with mouthwashes." The word "mouthwash" does not occur in my paper nor did I suggest such. The debris was to be forced from the gingival crevice, between the teeth, and the surface mucosa, by sprays of oxidizing solutions.

We find Dr. Merritt depends on mouthwashes to "embalm" fuso-spirilla, for in describing his successful treatment of a case, he says, "after removing gross tartar and bathing teeth and gums in a 40% solution of tincture of iodine, a 10% solution of potass. permang. was prescribed as a mouthwash." Unless the doctor succeeded in removing all the fuso-spirillary colonies by instrumentation and iodine, this is surely an attempt to "embalm" the remainder.

If Dr. Merritt believes so thoroughly in sealing and rubbing, why did he not curet the "white slough" "involving the hard palate" in the case he reports? Or possibly he would curet an acute diphtheria; which is a good "second cousin" to a Vincent's angina (pharyngeal). The gingival expression of Vincent's disease is only one of many involving the oral and pharyngeal mucosa; teeth are only incidental, just as is bone, and both are quickly lost when seriously involved by it. We are fortunate in having any medicament which is effective in ulcerous gingivitis, because we have none in the pyorrhetic types and must, therefore, resort to surgery.

Dr. Merritt agrees with me "that no wounds be made or tissue damaged during any phase of Vincent's disease," and yet says "the one thing absolutely essential to success in the treatment of Vincent's infection, and one that should take precedence over every other form of treatment, is the cleansing of the teeth and making the mouth as *sanitary as is possible. All the instrumentation that is necessary to accomplish this, can be done with perfect safety.*" (Italics mine.)

If the mouth is to be made "as sanitary as is possible;" that means modern instrumentation and thorough prophylaxis; implying much deep periodontal and cemental curetment and invasion of the tissues. I have observed carefully, and have been the patient and I know

of no one who can do this, without making wounds; if Dr. Merritt has such a technique, he should clinic hastily for the benefit of humanity.

But we find later, in describing a case he cured, he says: "the teeth were cleansed as far as possible, under the circumstances; the gross tartar removed, etc.," which means that they were scarcely cleansed at all, if only the "gross tartar" was removed; furthermore, as this is a disease of the young, a large percentage of cases have little or no "gross tartar" or calculus on the teeth. What does Dr. Merritt do with these?

So I do not agree that "all the instrumentation that is necessary to accomplish this, can be done with perfect safety"; on the contrary, instrumentation cannot and should not be done at this time, on account of the constant pain, which medicaments relieve; and anything short of thorough prophylaxis in any phase of any gingival disease is worse than useless, all of the time.

If the Doctor had read the references and the recent work, particularly of McKinstry and Taylor and Tunncliffe; or if he had checked up daily micro-organic conditions with slides under both types of treatment, as I have done, he might know that the oral secretions and mucosa are reeking with fuso-spirillary forms for the first few days of the acute attack, and that instrumentation, gross or fine, makes little difference; but that, with the local application of specific agents, such as dilute trichloroacetic and chromic acid and sprays of oxidizing substances, pain is relieved and there is a perceptible falling count in the fields of the third day; after which time, if the membranes disappear, prophylaxis will do no harm.

It is my belief that those really interested in the treatment of gingival disease, particularly periodontists, will agree with me that its pyogenic suppurative phase can rarely be cured, except by intelligent instrumentation and that medication is useless; while in the ulcerous phase, medication is most valuable and instrumentation should only be applied later. These men do not use such

terms as "gross tartar" when speaking of calculus on teeth.

In answer to Dr. Feldman, allow me to say, that many observers besides myself have noted the primary invasion of Vincent's disease in any gingiva chronically involved by traumatic occlusion, food pack, and ill-fitting fillings or crowns; therefore, in Dr. Feldman's reported case, I should suspect such prior areas on that side of the mouth.

The localizing factor about slowly erupting third molars, for instance, is undue exposure of the gingival crevice, the undeveloped ligamentum circulare laying it open to many other types of infectious trauma, beside the fuso-spirillary, as we all know.

No central origin has been proved, it has only been suggested in Vincent's disease, so there can be no value in a classification of a uni- or bi-lateral ulcero-membranous gingivitis; nor can it be made, any more than in the angular or pharyngeal invasion which usually involves one side and spreads.

Fuso-spirillary infections progressively invade all damaged mucosa during an acute attack and any one who can do a Gram stain will be satisfied as to the infectious character of the saliva, when compared with the normal.

Dr. Feldman does not state in his case whether the disease was acute or chronic. If chronic, it may have been a subacute recurrence, as the acute state is rapid. Possibly his patient was infected sometime during the two months after leaving camp.

The American camps had their percentage of this disease, regardless of the usual hygiene, and I have seen it spreading in the dormitory of a select private school, where there could be no question of personal hygiene. That was the object of my paper, which in its hygienic warning was timely, if nothing else.

If these gentlemen will confer with those who saw military duty and had to combat much of this disease, they will. I am sure, join with me in a constructive critical effort to eliminate this disease.

CLARENCE J. GRIEVES, D.D.S.,

BALTIMORE, Md.

## "A Case of Necrosis of the Mandible."

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TO THE EDITOR OF THE DENTAL COSMOS:

*Sir*,—The following case may be of interest to the readers of the DENTAL COSMOS:

E. D., common laborer, age twenty-eight, as a result of the extraction of an abscessed molar tooth, four months before the case was referred to us, presented a necrosis of the mandible from one angle of the jaw to the other, with extensive suppuration and with five fistulas around the neck, one of which was situated just a little above the clavicle on the left side. These fistulas were discharging continuously a thick yellow pus with a foul odor. An examination of a sample proved it to contain staphylococcus, streptococcus, and the like but no tubercle bacilli as was at first thought from the appearance of the pus. It may be well to note that during the course of the necrosis, the patient never had any rise in temperature.

After about a week of pre-operative treatment an operation was performed under ether and the whole body of the mandible was removed. The sinuses were well drained for some time and in about two weeks the patient was discharged from the hospital, although he had to return for daily treatments. He is doing very well now and, aside from the natural disfiguration accompanying such operations, is much the same as he was in his normal condition and says that he feels quite capable of and is anxious to resume his work.

In performing the operation, great care was taken to leave as much of the periosteum as was possible and we are keeping the case under observation to see if any new bone is formed. Further developments in connection with the case will be reported in due time.

Dr. P. G. DEL VALLE.

6 CRUZ ST., SAN JUAN, P. R.

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# PROCEEDINGS OF SOCIETIES

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## Dental Society of the State of New York.

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**Fifty-first Annual Meeting, held at Syracuse, N. Y., June 12, 13, and 14, 1919.**

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(Continued from page 116.)

### FRIDAY—*Evening Session.*

The meeting was called to order at 8.15 by the president, Dr. Beach.

#### **Presentation of the Fellowship Medal.**

Dr. BEACH. I have a very pleasant duty to perform this evening. Fourteen years ago, a good friend of the New York State Dental Society, a man well esteemed in our state and in our national dental profession, Dr. William Jarvie, presented to this society a sum of money, the income from which should be applied each year toward the purchase of a medal to be presented to the person who had performed, during the year, work of great value, either in scientific or other fields of dentistry. The committee appointed to administer this fund and recommend those who shall receive this medal, has unanimously reported, and it is at this time that we are to present the William Jarvie Fellowship Medal to the one deemed most worthy of it this year.

The honored guest of this evening is a man who has had varied experiences in dentistry, a man born in the State of Illinois and educated in its public schools. He graduated as valedictorian in his class from the Chicago College of Dentistry. He also graduated from the Chicago College of Medicine, and after his graduation was associated for many

years with one who has already received the Jarvie Fellowship Medal from this society, Dr. Truman W. Brophy.

After several years' service as first assistant with Dr. Brophy, our honored guest opened his own office and took up the general practice of dentistry, later giving up that practice for specialized work in oral surgery and pyorrhea alveolaris. He has been a frequent contributor to the literature of dentistry and to its magazines. He has been of great service to the dental societies of this country, serving the Chicago City Society, the Illinois State Society, and last year the National Dental Society, as President.

When war came upon us and we joined forces with the Allies, he was called to Washington, where he served with great credit to the profession and with great credit to himself as a member of the General Medical Board Council of National Defense. He was appointed chairman of the Committee on Dentistry of the General Medical Board Council of National Defense, and on the Enlistment and Legislative Committees he has performed services which will never be forgotten in dentistry.

When war was declared, we had one dentist to 1000 men in the army. Owing largely to the efforts of our guest of the evening, the laws were changed to provide a representation of one dentist to 500 men, instead of one to 1000.

Immediately upon the opening of enlistments there came a flood of patriotic responses from the dentists. Ten thousand men came forward offering themselves for service in this country or abroad. No profession has won greater honor in war service than the dental profession, and its leader in this service is the guest whom we are to honor this evening. He has performed a great service for dentistry, but it has also been done as a patriotic service for his country. After that service had been performed he went to France to review some of the products of the service which he created. He has been the recipient of great honors while abroad, and upon his return to this country has received the ovation and compliments of our profession. We are delighted this evening to have Col. William H. G. Logan with us as our guest. Lowell has said: "For all the lessons thou hast taught the world, we honor thee," and, tonight, Col. Logan, for the lessons you have taught us in surgery, in literature, and in executive service, we honor you.

It gives me great pleasure on behalf of the New York State Dental Society to present to you the William Jarvie Fellowship Medal, and at this time to pronounce you a Fellow of the Dental Society of the State of New York.

Dr. LOGAN. To you, Dr. Beach, President of the New York State Dental Society, under whose direction this gathering has assembled, to the members of the Fellowship Committee, and to Dr. Jarvie, through whose generosity this annual occasion has been made possible, to all of you and to each of you, permit me to convey my profound and sincere appreciation of having been deemed worthy of receiving this distinguished honor as the result of my military and professional activities. I am particularly pleased to receive this signal recognition from the State of New York, for it was here ninety-two years ago in the little hamlet of Bath, that my father was born and later grew to young manhood in the city of Elmira. Therefore, if you will permit me to express my intimate

feelings, this gold medal is being presented by the New York State Dental Society to a native grandson of the Empire State, and as such I ask that you accept and retain me. If I truly appreciate this occasion and this fellowship medal, it will be shown more definitely by my acts for the cause of dentistry in the future than by mere statements made here tonight. In conclusion, Mr. Chairman, permit me to again thank you for the kind words expressed in your presentation, and all here assembled for your most hearty and cordial reception.

Col. WM. H. G. LOGAN then read a paper entitled: "Dental Service in the United States Army During the World War."

[This paper is printed in full at page 216 of the present issue of the DENTAL COSMOS.]

The meeting then adjourned to Saturday morning at 10 o'clock.

#### SATURDAY—*Morning Session.*

The meeting was called to order by the president, Dr. Beach, at 10.15 o'clock.

Dr. GEO. V. I. BROWN read a paper entitled: "Surgical Restoration of War-injured Faces and Jaws."

[This paper is printed in full at page 206 of the present issue of the DENTAL COSMOS.]

#### DISCUSSION.

Dr. Henry S. Dunning, New York City. I listened with much pleasure to my friend, Dr. Brown, who has described so beautifully the work that has been done.

I regret very much indeed, and I cannot say it too strongly, that there were not more men here to listen to his paper, that there is not more interest shown in this maxillo-facial work over here. The French and the British and the Italians are far ahead of us in this work. The American dentist is known for his wonderful ingenuity and his mechanical appliances, but the French and the British



and the Italians have gone ahead of us during the last few years. I wish you could see the appliances they are making to hold up the nose and parts of the face. The dentists are doing it, and they are making prosthetic appliances with glasses for the eyes, and false ears and moustaches, which are worn between the different steps in the operation. The patients do not wear these permanently, but if a man is going home on a vacation—as they let these men go home in England if the men live on a farm, or near a hospital center, so they may recuperate and get ready for the next operation in about six weeks—they put these appliances on so the men can travel in the cars or on the street without attracting undue attention. These men are very sensitive and very much depressed and it is a wonderful reconstruction work.

The dentist and the surgeon have accomplished wonderful results together. The co-operation of the dentist and the surgeon is absolutely necessary, and is one of the great things the war has brought about. It took the surgeons of Europe about two years to appreciate this and in the French army, or the British army, they have not yet a dental corps. A man like Villain, in the French army, a professor of prosthodontia at the Dental School in Paris, was a sergeant until a short time ago, and had no dental insignia. The dental men were put in a miscellaneous corps, with no special insignia, and this splendid man was made to serve under the medical men, and have no recognition. They expected us to come over there with our wonderful dental knowledge and do wonderful things, and I think it would have been done had the war lasted a little longer. Speaking from the experience I had, I was with Blair, and I was there before Blair brought his highly trained men, it took our men quite a while to realize that they had to have emergency kits and special appliances like Villain had—fracture bands and different things sufficient to care for probably 200 injured at one place. The French had these in the evacuation hospitals and in the ad-

vance dressing stations, where one dental surgeon could take care of 200 men; we had nothing like that. When Blair and his men came over to Europe last April there was no organization, and supplies did not come through until August and September. The splendid maxillo-facial outfits did not reach us until later.

I think it is the greatest art in the world to reconstruct a human face, but the machinery necessary to enable the corps to do this work did not get to running well until the war was nearly over. In another six months our work would have compared very favorably with that of the French and British. Up to the time the armistice was signed, however, we did not accomplish a great deal. I was in a large head reconstruction center at Vichy. When the battle of the Argonne occurred instead of having 1040 cases, as our hospital outfit called for, we had from 2700 to 3000 cases all the time. They came from the front to our hospital, and we were supposed to take care only of injuries above the clavicle. We had a brain specialist, a nose and throat man, an eye man, and a maxillo-facial service, everything laid out in a fine hotel; but we were swamped with patients who came from the front with fractures of hips, arms and legs, and with chest and abdominal wounds as well as pneumonia and gas cases. The patients were lousy, unshaven, and filthy, and many had not been properly fed. Some of them had been on trains left at sidings for two days; their wounds had not been attended to for four or five days, and the dressings were absolutely dry. At times all we could do was to keep these men clean and warm, and feed them.

Most of the work of the maxillo-facial department, therefore, was clean-up work, and the work that Dr. Brown has spoken so modestly about laid the foundation for the work to be followed up over here; but over there it was a case of clean-up and keeping the men happy and warm, and if you could dress the wounds every day, you were very lucky.

It was just a case of trying to do the best we could. The work being done



here is really the finished, fine work; and I feel Dr. Brown has had much to do in the preparation for the reception of the men from overseas.

Blair's idea of very early operation could not be carried out. He rather expected to operate before suppuration occurred. He wanted to prevent later scars and cicatrices from causing deformity. Every surgeon knows a plastic case should be operated upon at once, if the tissues are clean enough. You can operate upon these cases at once, or do it considerably later when most of the suppuration has ceased. It is either early or late. We seldom got those cases early, however. The evacuation hospital was supposed to be the place where all the big surgery was being done. There was the regimental aid station, the dressing station and the field hospital; but at the field hospital they were being shot at most of the time, and no work was done there under shell fire. They would not let a brain case or an abdominal case go back if the field hospital was not being bombed; but when under fire they would send them to the evacuation hospital. That is a big hospital with about 1200 beds, 20 or 30 doctors, X-ray machines, and everything necessary, and there the general surgeon is stationed who could do anything—open a brain, or an abdomen. There was generally a plastic surgeon or oral surgeon who could take care of all the jaw and face cases. There was often an eye man, an ear man, nose and throat man, and other specialists. At Soissons, where I was attached for a time, they had all their material, nine truck loads, and these trucks had never been unloaded. When we went to this place there were 200 cases lying on the ground in the rain needing care at once. The next morning 600 more came in. For forty-eight hours the men were just lying there; all we could do was to give a man a cigarette and something to drink. From 7 to 7 there might be one hundred cases for your team to clean up. There would be a large table, and you would work until 12 o'clock, and you would get some supper, or hot tea. Each team would

have two tables; your case would be placed on the table and, just as you finished, another patient would come on, and so on. If a push was on in that sector, you would be busy all the time. You might have 75 cases to clean up, or 200, and you might stay on 18 hours, or your allotted 8 hours. They tried to keep the men on only 8 hours, because a man will do better work if he is not too fatigued.

We could not get to these special cases early, as a rule, and I do not believe in "war time" we can plan for special work. The only time we get these cases is when the push is on, and when it is on we could not take care of them. They called it "war time" or "peace time" in the sector. We were generally either rushed to death, or had nothing to do.

I think Col. Blair's idea of the teams was absolutely right, and a great deal of the early splinting was excellent. Ingenious splints were made, and had the war lasted longer we would have gotten Villain's outfits in all the hospitals. We had dental surgeons, and I think oral surgeons, in most hospitals. There were not enough oral surgeons to go around, but there were dental surgeons in all the hospitals.

I never saw anything to compare with the wonderful way our boys stood it over there. We used to see them coming in after they had been on the French trains for four days. They would come in on a stretcher in a pair of pajamas and one blanket, when most of us would have our overcoats on. Perhaps 800 boys would come in, and we would give them a cigarette and a hot drink, and ask them how they felt, and they would say: "Fine. How are you feeling?"

I want to take off my hat to the doughboy, to the poilu, and to the Tommy; and also to the nurses.

**Dr. Brown** (in closing). I would like to say why I am particularly gratified to be able to come here at this time. Some of you know I never miss an opportunity to attend a meeting of the New York State Dental Society if I am invited, and I always enjoy the meetings. It seemed to me that at this time

there is in relation to the subject of the surgical restoration of war-injured soldiers an underlying definite reason why its dental aspect should be very important, and that this ought to be kept in mind by all whose interests center in oral surgery.

When I was called to Washington, I found a very perfect organization in the Plastic and Oral Surgery Section of the Head Surgery Division. This foundation was laid by Col. Blair and Major Ivy, and in the Dental Corps by Col. Logan, and it was this organization which provided for the overseas hospitals those men who did such wonderful work. Part of my duty was to appoint men to do plastic surgery in overseas hospitals, and it seemed inadvisable to assign men that I did not know could do this work successfully. It therefore became necessary to establish a school to teach plastic and oral surgery, and I had for a short time, until the signing of the armistice, an opportunity to run an ideal school. It soon became evident that it was perfectly useless to have a school to train men as plastic and oral surgeons alone. Unless we could also teach the other men who were going to do other kinds of surgical work, it would not accomplish much to have a few men who knew how to do a few things, but which they might or might not be allowed to do when they went to the front.

Col. Edward Martin, who had charge of the teaching in the surgical schools, very quickly fell in with the idea, and the result was that his teachers in the School of General Surgery came over and taught in the School of Plastic and Oral Surgery and the instructors from the School of Plastic and Oral Surgery taught in the School of General Surgery. I was able to talk to the general surgeons about the first steps in the treatment of those cases that they would get first opportunity to administer to in the trenches before our special surgeons could get the cases, and to impress upon them the fact that upon this care would depend the character of such plastic reconstructive treatment as might be possible for the plastic surgeon to do later on.

Col. Martin made a practice of being present during these lectures and often called for further explanations, which led to a wider understanding and appreciation of all the points. It resolved itself into a school to teach general surgeons the first steps in the care of these cases, and to teach the dental surgeons how to take care of cases in such a way as to provide for later general surgical treatment. All of those schools, the school of Ophthalmology, Otolaryngology, Orthopedia, Dental Surgery, and General Surgery, became closely united through constant exchange of lectures so that they became really one big school.

The next thing was to see that the men on the other side got full credit for their work. I had charge of all the men for a time, and so I saw in a collective way the results of what had been done, and through my experience I was able to know something of the difficulties under which the work was done. We shall not for years fully appreciate what those men did over there under difficult conditions and with no equipment to speak of. Just recently, at Atlantic City, I was gratified to see in the daily bulletin of the American Medical Association the statement that the greatest advance that was shown in that meeting as a result of the war was in maxillo-facial surgery.

I do not want to see all that drawn away from dentistry, as we understand it, in a meeting of this kind. I hope bodies like this, where there is represented the best that there is in dentistry, will see to it that the credit which belongs among the dentists remains there, and that it is not drawn away to be utilized as some sort of appendage to general surgery. That is your duty and that is why I am here particularly; that is the story I want to leave with you, and the idea I hope you will carry away.

The PRESIDENT. We are always delighted to have Dr. Brown with us. He always brings us something of pertinent value, and we thank him for his appearance before us. He has gone out of his way to be with us, and we thank him most sincerely.



The President appointed Dr. Leak and Dr. Hoffman to escort the president-elect, Dr. Horace P. Gould, to the rostrum.

Dr. GOULD. If there is no further business, I declare the Fifty-first Annual Meeting of the New York State Dental Society adjourned.

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## New Jersey State Dental Society.

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Forty-ninth Annual Convention, held in Atlantic City, N. J.,  
July 16 to 18, 1919.

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### WEDNESDAY—*Morning Session.*

THE forty-ninth annual convention of the New Jersey State Dental Society was held at Young's Million Dollar Pier, Atlantic City, N. J., July 16, 17 and 18, 1919.

The President, Dr. George W. Wakeley, Orange, N. J., called the convention to order at 11 o'clock.

The Rev. ROBERT E. ELLWOOD, of Atlantic City, invoked divine blessings on the deliberations of the society.

THE PRESIDENT. I take great pleasure in introducing to you a gentleman who is here as a representative of Atlantic City to welcome you, Dr. Cochran, who will now address you.

### Address of Welcome.

Dr. COCHRAN. *Mr. President and gentlemen of the New Jersey State Dental Society,*—It has fallen to my very happy lot to welcome you this morning in behalf of our Mayor, who, unfortunately, had to be out of the city. He regretted very much not being able to be present, but there are times, of course, when his business takes him away from the city and so, in his place, I am going to extend to you just as hearty a welcome as our Mayor would have extended, because I am just as deeply interested in having you in Atlantic City as are all the rest of our people. We welcome you not merely as a convention. However,

we want conventions in Atlantic City; we are a convention city. We make an appeal to the officers of the conventions held in all parts of the country and invite them to come to Atlantic City because we believe that we have one of the best cities in the world in which to meet. We have ample facilities; we have over 1200 hotels, and some of them are as fine as any hotels in the world. We are proud of them and we are proud of the men who run them. We are proud of the men who run these hosteleries because they are men who have worked their way up, most of them as poor boys from the country, and today they rank among the best citizens of our city and among the best citizens in the business that are to be found anywhere in the United States. We are proud of them and the record they have made. We are proud of our city; we are proud of our city's institutions; we are proud of our fire department, our police department, of our boardwalk, because we believe that any woman can walk up and down our boardwalk at any time of the day or night without being annoyed or molested. We are proud of the record even back in those dark days when we sold whiskey,—you remember—that time away back,—even then, women could walk up and down our boardwalk in perfect safety and even then in those days we did not see men stagger along our boardwalk; not drunken men. We kept our boardwalk clear and clean.



So we welcome you, and as I have said before not just merely as a convention, but as citizens of this great country, we welcome you because of the fact that you in this profession of yours are men of vision. You are men whose vision extends away beyond the ordinary horizon of the ordinary man; you are professional men; men of character, men of ability, men of force. This great nation sees you and is going to look to you and is looking to you now for your assistance. They want your help and in your own cities you will find that your people are looking to you for guidance and they are looking to you for counsel, and there is resting upon you a great responsibility as professional men in your respective localities.

I want to say to you, as the information has come to me, that your record during the great conflict which has just passed is very enviable; that of all the professions in the country yours sent a larger proportion of men to the front than any other; that more men responded than from any other profession and that there actually was a surplus of dentists. I do not know why you should be more loyal than other people, but it seems to me that you were and it is to your credit. This flag back of you (pointing to a service flag at the rear of the hall) speaks eloquently of the pressure which was brought upon your people and the responses that were made and the part that you have played in the great world war which has just closed. Out of it came this thought, that they never knew before to what a tremendous extent your profession served the country and what your association and your professional men did until they joined the service from all over the country.

Down in Washington I had occasion to visit General Blue's office and he said to me, "There are many men whose teeth are in such bad condition that they could not be sent across at once; the number of such men is so great, that they could have turned the tide of battle." They realized that a man to be strong in body must have good teeth with which to masticate food and it is that that makes the able-bodied man, and so

they found out what perhaps they never knew before, that a great deal depends upon your profession and that in this great war a great deal depended upon you men.

There are great problems to be settled in this country. I have stood on every platform in Atlantic City and I have told the people here that the problems of peace are infinitely greater than the problems of war and I believe that history is going to bear out that statement. There are problems that confront you and you must step outside of the path of your profession and you must help to rehabilitate the world and the world is going to appeal to you and rely upon you for help. You see that your profession has made remarkable strides, and if I am wrong I hope you will correct me, but history tells me that America leads in the great profession of dentistry. I am told that in 1839 the first college was erected, in the interest of dentistry, in Baltimore. I am told that in 1858, England, with all her civilization, her advances in science generally, first took up dentistry; in other words, the United States established a college in 1839 while England did not establish any institution of the kind until 1858, and it was not until 1878 that dentistry was legalized in England. America, therefore, has led all foreign countries in dentistry and has been leading them by many years and is ahead of the other nations of the world. I am proud of the fact that I am an American and I am proud of the fact that the people of America did that. So we welcome you to Atlantic City, and we are glad to have you among us. We are proud to know you and proud that you have selected our city in which to meet. I hope that you will want to meet here again next year and in the future and I will be glad to see you.

The PRESIDENT. What is the further pleasure of the Convention?

Dr. STILLWELL moved that a vote of thanks be tendered to Dr. Cochran for the address of welcome delivered to the convention.

(Motion carried.)

Vice-President Charles F. Jones in the chair.

Chairman JONES. Gentlemen, we will now listen to the annual address of the president, Dr. George W. Wakeley.

#### President's Address.

By GEO. W. WAKELEY, D.D.S., Orange, N. J.

*Members of the New Jersey State Dental Society, ladies, and gentlemen,—* The year just ending for the society has been marked by events undreamed of a few years ago. A year ago America was just getting into her stride, and now, in a few short months, peace has been declared, the larger part of our armies have been restored to civil life, and we face the world with a new courage, a new assurance, and the knowledge of a good job well done. Mistakes have been made, and as we look back some of them seem wholly unpardonable mistakes, but it is a question after all whether the end did not justify the means.

#### AMENDMENT OF THE CONSTITUTION.

In our own little world, the State Society, events have taken place which have caused more or less bitterness and dissension. As our constitution now stands, this society has not adequate power to discipline a member who transgresses the code of ethics. I recommend that the Amendment Committee so amend the constitution (subject of course to the approval of the society) as to make action by the Board of Trustees mandatory upon the local societies. Please remember that next to the National Society, the State Society is the parent society and should control the action of the local societies when the infringement of the code of ethics reflects upon the State Society. There would always be, as at present, the final appeal to the National Society.

#### THE JOURNAL.

The society must decide, and decide quickly what it will do with its official organ, *The Journal*. It has been my

privilege in the past few months to learn something of the burden Dr. Albray has to bear in his efforts to carry on this publication. Frankly, I could not be induced to do the work in the face of such discouragement. The advertisements and the paid subscriptions will carry the magazine for about eight months. The society has been called upon or has volunteered through its trustees to help out for the other months; in other words, to make up the deficit. Several of the local societies have included in their yearly dues a sum sufficient to pay for each man's subscription, but this alone is not enough. If *all* the societies did this it would not be enough, for just here another question comes in, that of circulation. If we cut that down appreciably we get into trouble with our advertisers, who expect, and demand a circulation large enough to warrant the money they spend for advertising. The present business management of the *Journal* is as good as can be, but the volume of business is limited. We all know that we need the *Journal*. Do we not need it more than a dollar's worth? I recommend that the subscription be advanced to one dollar and a half beginning with 1920. This however corrects only a part of the trouble. Dr. Albray needs food for the *Journal*; he has told you this time and again. In the past year he has had some response to this appeal, but not nearly enough. He likes the work, is ready and willing to do it but he *must* have material. Some of you, many of you can help him; will you do it?

#### ELECTION OF OFFICERS.

One of the best and wisest things the society has ever done will be inaugurated on Thursday—the election by ballot. With the nominating petitions properly filed, this should prove so simple and so satisfactory that no question should ever arise as to its advantages. It is so much better than any other method heretofore employed that it requires no argument. Through some error or mistake an amendment appears in the list of



amendments passed last year which, if it had actually passed, would have nullified all the other amendments pertaining to the election of officers. Inasmuch as this amendment through mistake found its way into the records, it was deemed wise to print it with such explanation as was necessary. It is not conceivable that this society in convention assembled should pass the various amendments that it did to enable it to vote by ballot and then deliberately wipe them all out by specifying that ballots must be written.

#### THE ANNUAL DINNER TO THE PRESIDENT.

At the risk of seeming ungrateful I wish to speak of the president's dinner. The one held in December last was, without question, the best we have ever had. Mind you, I do not say this because I was the recipient, other people said it, too; but, and this is where I may seem ungrateful, it cost the society too much. If I did not care for the welfare and health of this organization, I should say nothing and be thankful I had as good a time as I did. Two courses are open, we can omit the dinner entirely, and with our semi-centennial just ahead of us this seems to me impossible, or we can make our dinner fee adequate to meet *all* the expenses of the dinner. Personally, I think the dinner committee should submit its estimate to the Board of Trustees and confine itself to some definite amount to be agreed upon. I agree that this seems in poor taste, since I have had *my* dinner, but someone had to say it. While our exhibits this year are greater in number than last year, they are not nearly so remunerative, so that we enter into our 50th year with a depleted treasury. This is, in a sense, my excuse for what I have said.

Naturally, we all look forward to the convention of 1920 as an event of marked interest. We can, if we will, make it something to be long remembered. It means more work, more effort, and a greater willingness on the part of each of us to do his share and for this I strongly plead.

Dr. ALBRAY moved that a committee of five be appointed as a committee on president's address.

(Motion carried.)

Chairman JONES appointed the following as a Committee on President's Address: Dr. Manning, Dr. Hopkins, Dr. McClernon, Dr. Clawson and Dr. Shoemaker.

The PRESIDENT resumed the chair and announced as the next order of business Reports of Committees.

The PRESIDENT. Next in order is the Report of the State Board of Registration and Examination in Dentistry of New Jersey. In the absence of Dr. Forsyth, who has received news that his father was very ill and has returned to his bedside, Dr. Barry has been regularly qualified to act in his place as secretary of the convention. I will therefore ask the acting secretary, Dr. Barry, to read the report of the State Board of Registration.

#### Thirtieth Annual Report of the State Board of Registration and Ex- amination in Dentistry of New Jersey.

TO HIS EXCELLENCY, HON. WILLIAM N. RUNYON, GOVERNOR OF NEW JERSEY:

*Sir*,—In accordance with Section 2 of "An Act to Regulate the Practice of Dentistry in the State of New Jersey and to Regulate Certain Acts now Relating to the Same," Chapter 146, Laws, Session of 1915, approved March 31, 1915, we have the honor to submit to you our thirtieth annual report.

In June 1918, thirty-one of the seventy-eight candidates examined were successful and were granted licenses.

Forty-four candidates appeared for the December 1918 examination and of this number eight were licensed.

As many young men out of college who had entered the military service without an opportunity to take the examinations were discharged soon after January 1, 1919, this Board felt that it was their duty to grant them an examination at an early date and therefore a special examination was conducted in the Second Regiment Armory, Trenton, the first week in March. Seventy took advantage



of the opportunity and twenty passed the examinations.

At the regular June examinations just finished, one hundred and twenty-seven candidates appeared, but the Board will need considerable time to examine the papers and be ready to report on this class.

During the past year considerable equipment has been added for use at the examinations. Another safe has also been provided for the Secretary's office in which to store the records of the Board. The purchase of an adding machine and an addressograph machine with over sixteen hundred plates has better equipped the office.

As under Section 2, Chapter 269, Laws, Session of 1917, this Board was able to retain but \$100 of the balance on hand June 30, 1918, it was necessary to borrow \$1000 from the State House Commission to carry on the work of the Board until revenue was received from examination fees. Of this amount \$549.70 was used and has since been repaid.

The Board has continued its campaign against illegal practitioners and thirty-two convictions have resulted from the many investigations made by the agent of the Board; two were for the second offense. Decision on two cases has been withheld by the judge for nearly two years.

Appended hereto is a report of the Treasurer, showing receipts and disbursements from July 1, 1918, to June 30, 1919.

Respectfully submitted,

THE STATE BOARD OF REGISTRATION AND  
EXAMINATION IN DENTISTRY OF NEW JERSEY,

C. F. ALFRED HANE, *President*,  
WILLIAM I. THOMPSON,  
WILLIAM H. GELSTON,  
ARTHUR L. WESTCOTT,  
M. R. BRINKMAN,  
FRANKLIN RIGHTMIRE,  
CHARLES A. SPAHN,  
JOHN C. FORSYTH, *Sec'y*.

The PRESIDENT. You have heard the report of the State Board of Registration and Examination in Dentistry of New Jersey. What is your pleasure?

Dr. STILLWELL moved that it be approved and accepted as read.

(Motion carried.)

The PRESIDENT. The next in order is the reading of the Report of the Sec-

retary, New Jersey State Dental Society. Acting Secretary Barry read the report.

Dr. CHARLES F. JONES moved that the report of the Secretary as read be received and placed on the record.

(Motion carried.)

The PRESIDENT. Next in order is the report of the Treasurer, New Jersey State Dental Society. Treasurer Faupel read his report.

Acting Secretary BARRY read the following communication:

### The "John R. Callahan" Memorial.

At the December 1918 meeting of the Ohio State Dental Society a resolution was adopted to perpetuate the memory of the late John R. Callahan in recognition of his contributions to the science and art of dentistry and his unselfish devotion to its advancement throughout the many years of his professional life.

The Committee to which this Memorial was referred has decided on the following as the most appropriate, and worthy of the approval of the profession:

*First.* A Bronze Memorial, to be placed in the Cincinnati General Hospital grounds.

*Second.* A Callahan Memorial Research Fund, the income from it to be awarded from time to time to the person making the best contribution to the Science and Art of Root-canal Problems. The fund and award to be under the direction of a committee perpetuated by the Ohio State Dental Society. The prize to be known as "The John R. Callahan Award."

The sum necessary, in the minds of the Committee, to carry out the Memorial in its two phases should approximate \$8000, an amount that should speedily be raised in these times when the spirit of giving is universal.

Subscriptions to this fund by individuals or societies will be duly credited, and should be forwarded to the Secretary-treasurer of the fund.

T. IRVING WAY, *Chairman*,  
52 Groton Bldg., Cincinnati, Ohio.  
HENRY E. GERMANN, *Sec'y-Treas.*,  
717 Gwynne Bldg., Cincinnati, Ohio.  
L. L. BARBER, Toledo, Ohio.  
WESTON A. PRICE, Cleveland, Ohio.  
L. E. CUSTER, Dayton, Ohio.  
EDWARD C. MILLS, Columbus, Ohio.  
*Committee.*

The PRESIDENT. What is your pleasure?

Dr. HOPKINS moved that the matter be referred to the Board of Trustees of the New Jersey State Dental Society with power to act.

(Motion carried.)

On motion, the Convention adjourned until 3 o'clock P.M.

### WEDNESDAY—*Afternoon Session.*

President Wakeley called the convention to order at 3 o'clock P.M.

The PRESIDENT. *Gentlemen*, it affords me a great deal of pleasure to introduce to you Dr. Angelo Zabriskie of Ridgewood, N. J., who will read a paper this afternoon which will be of great interest to the society. He has, I think, one of the most remarkable messages to the dental profession that we have had in a great many years. The title of the paper is, "Complement Fixation Tests as Applied to Dental Practice."

[This paper is printed in full at page 201 of the present issue of the DENTAL COSMOS.]

### DISCUSSION.

Dr. J. I. Woolverton, Trenton. *Mr. President*, it seems to me after listening to this paper Dr. Zabriskie has read, that it is very nearly the first and only one on this subject that has put anything along this line in a common-sense form. Judging by the complement fixation tests he is making not only for one strain of bacteria but for numerous others, it would seem as though we are coming to a time when we are going to find out something in regard to infection.

Professor H. R. Miller, New York City. *Mr. President and gentlemen*,—I know very little about the teeth, but I have been fortunate enough to work along bacteriological lines, and I am, therefore, interested in the subject of Dr. Zabriskie's paper.

It is well known that many different types of bacteria can produce distinct kinds of immune antibodies. These

immune antibodies are often called forth by the respective causative agent of disease (called antigen) and may be protective or diagnostic in character. Thus diphtheria bacilli produce specific diphtheria antitoxins; typhoid bacilli, typhoid agglutinins, tubercle bacilli, complement fixing antibodies. In many quarters it is supposed that streptococci can produce specific complement fixing antibodies capable of giving a distinct and specific complement fixation in streptococcus disease.

Technically, we have found it not easy to obtain reliable tests in streptococcus fixation. We employed several strains as antigen, titrated our serums up into large amounts, but procured strong inhibition results very seldom, and weak reactions, at times, upon which we hesitated to place much valuation.

Apart from purely technical consideration, it must be remembered that even if these complement fixing antibodies should be present in streptococcus infections, their detection and measurement may not be easy, because they may occur in very varying amounts. This fluctuation in antibody content is present in tuberculosis, for instance. This factor alone may be an important one in any consideration of the problem treated in Dr. Zabriskie's paper and, for this reason, I am somewhat at a loss to understand how his results were so seemingly consistent.

It is not wise, for the present, to hope that all diagnostic serum tests will prove to be as useful and well founded as the Wassermann test. Singularly, the Wassermann test is not specific at all in the serological sense, but it is reliable and of undoubted value. In the streptococcus fixation test we are trying to establish a specific reaction with streptococci for antigen, working with serums from patients who present, as a rule, mild subacute general constitutional symptoms. The conditions are very different from those obtained in syphilitic infection and it is, therefore, unwise to expect a similar and identical serum test.

We need not enter here into any detailed discussion of the generally ac-



cepted theories and understanding of the factors at play in infection and resistance. Dr. Zabriskie's results and the explanations he invokes are quite at variance with our own experiences.

**Dr. Zabriskie** (closing the discussion). *Mr. President and gentlemen*,—I have not a great deal to say in response to the discussion of Dr. Miller. I think my paper, from the clinical standpoint, fully covers the points that he disagreed with. I do believe just as I said in my paper that complement fixation is of little use when used alone. Complement fixation *alone* does not mean much, but with the extensive radiographic examination of teeth, accessory sinuses and gastro-intestinal tract, that the patients go through, coupled with their clinical symptoms, means very often the missing link of diagnosis in obscure cases. These obscure cases are cleared up by the removal of the infection which we often find by the aid of our complement fixation. If we find a streptococcus fixation when a complement fixation test is made, it does not necessarily mean that there is, without doubt, a focus of streptococcus, but it does in the majority of cases. We know this clinically, because of people who have obscure cases through which the complement fixation supplies a lead toward finding the focus of infection.

Take the case for instance of the man who was told to have all his teeth extracted. He had gastro-intestinal disturbances. It was suspected that there were possibly other foci of infection besides the teeth that needed looking into. His teeth were negative on X-ray examination. His blood count was low. The complement fixation showed a fixation for a certain type of bacteria and, after a series of radiographs were taken, we found that he had a complete viscerop-tosis and improper functioning of the intestines. He received treatment for this condition alone and in three months the man was playing golf and in good health; not only that, but his blood count was normal. This man had the benefit of complement fixation and in this case it was the means of leading to a diagnosis.

It is true that streptococcus can exist around teeth and may not be causing any systemic trouble, because the resistance of the patient at the time is high and is taking care of the infection.

We must be careful in making these complement fixation tests. We must be familiar with the advanced technique and use it for what it is worth.

**Dr. WOOLVERTON** moved that a rising vote of thanks be tendered to Dr. Zabriskie for his excellent paper.

(Motion carried.)

**The PRESIDENT.** Mr. Arthur C. M. Herdling will now read a paper on "The Theory and Technique of the Complement Fixation Test in Blood Work and Its Application in Cases of Focal Infection."

[This paper is printed in full at page 198 of the present issue of the DENTAL COSMOS.]

#### DISCUSSION.

**Professor H. R. Miller**, New York City. *Mr. President and gentlemen*,—There is not very much that I can say. It seemed to me all through this discussion Mr. Herdling gave us just a description of the method of complement fixation as applicable to many diseases. I understood that the subject of the paper was to deal with the adaptability and practical usefulness of a special form of fixation test as bearing on streptococcus infections, also complement fixation tests for streptococci as applied to dental work. I did not get this idea from the paper but just an explanation of how the serum test in general is done. We are interested in a clinical demonstration of what a streptococcus complement fixation test can do in the way of a diagnosis. We have tried the test, and in our hands it did not yield any appreciable clinical value.

In the main, for the present, you will have to depend upon your dental experience and judgment as to whether or not a particular dental focus of infection has a direct bearing upon the constitutional symptoms of a patient. Examination of the bacteria of the focus may yield data of distinct help, but as yet



it would seem wise not to lean upon the streptococcus complement fixation as an established or reliable test.

**Mr. Herdling** (closing the discussion). Dr. Miller has brought out some very interesting points with regard to the same difficulties we have been having recently. But what are we going to do? Take out all these teeth? If we can show that we have gotten from sixty to seventy per cent. satisfactory results of cases examined and treated, or suppose we get only twenty per cent. or ten per cent. streptococcus complement fixation, we have accomplished something. Professor Miller has referred to other symptoms. As far as tuberculosis is concerned that is a subject that is interesting to me, but I shall not go into detail and do not wish to touch on the work of the bacteriologist, as Professor Miller knows more about that subject than I do, and I think his work along those lines is beyond reproach.

Dr. ALBRAY moved that a rising vote of thanks be extended to Mr. Herdling for his paper.

(Motion carried.)

The convention adjourned until 8.30 P.M.

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### WEDNESDAY—*Evening Session.*

President Wakeley called the meeting to order at 8.30 P.M.

The PRESIDENT. I take great pleasure in introducing to you Major V. H. Kazanjian of the Harvard University Dental School, who will read a paper entitled "Observations on War Surgery of the Face and Jaws."

[This paper, fully illustrated, will be published in the March issue of the DENTAL COSMOS.]

Dr. HODGES moved that a rising vote of thanks be extended to Major Kazanjian for his wonderful pictures and splendid paper.

(Motion carried.)

The convention adjourned until Thursday morning at 10 A.M.

(To be continued.)

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## Connecticut State Dental Association.

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### Fifty-fifth Annual Convention, held at Hartford, Conn., April 15 and 16, 1919.

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THE fifty-fifth annual meeting of the Connecticut State Dental Association was held on Tuesday and Wednesday, April 15 and 16, 1919, at the Hartford Chamber of Commerce, Hartford, Conn.

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#### TUESDAY—*Morning Session.*

The meeting was called to order on Tuesday at 10 o'clock A.M., by the vice-president, Dr. Geo. S. B. Leonard of Mystic.

Dr. LEONARD. We all regret deeply the absence of our esteemed president, Dr. Sears, who is now in France. Dr.

Loeb will read a letter which Dr. Sears has sent to us.

(Dr. Loeb read same.)

Dr. O. T. RULE, Stamford, moved that a message of greeting be sent to the president, Dr. Sears, and that the letter just heard with so much pleasure be placed on file. (The motion was carried.)

#### COMMITTEE ON NECROLOGY.

Dr. E. S. GAYLORD, New Haven. During the time in which we have been permitted to occupy this position, we have

fortunately had no report to make on account of loss of members. This year, however, we have lost eight members, as follows:

Dr. Charles J. Royce, Willimantic, Conn.; Dr. Walter Grandage, Bridgeport, Conn.; Dr. James F. Carmody, Waterbury, Conn.; Dr. John J. McDonald, Waterbury, Conn.; Dr. Clarence E. Gates, Waterbury, Conn.; Dr. Geo. A. Maxfield, Holyoke, Mass. (Honorary Member); Dr. W. S. Smith, Mystic, Conn.; Dr. R. W. Brown, New London, Conn.

A motion was made to accept the report and place it on file.

Dr. LEONARD. Letters of regret have been sent to the families of the deceased members, and we also took the liberty of sending flowers when we knew of the death of the member in time.

Dr. Leonard requested the privilege of having the report of the Committee on By-laws come at the end of the program.

#### REPORT OF COMMITTEE ON DENTAL LEGISLATION.

Dr. A. C. FONES, Bridgeport. I think this is the first time since 1907 that the Committee on Dental Legislation has not been obliged to go before the Legislature to combat the registration of assistants. This is the first time we have not had a bill before the Legislature in which registered assistants were attempting to get the right to practice without taking the state examination. Just why this is so, I do not know; but we have not had that to contend with this year.

There was a bill presented, apparently from South Manchester, for the right of towns and school districts to have in their budget an appropriation for dental hygienists in their public school system, and also the right of governing the appropriations of such moneys as they deemed proper for the public school system. Evidently South Manchester found they had not the legal right in their charter to make such appropri-

tions, and they sought through the Legislature the opportunity to have a statute placed on the books to give them such privilege. I do not remember the exact wording of the bill, but it was to the effect that, when any town or school district desires to employ a dental hygienist in its public school system, and shall ask for an appropriation from the financial board, the governing or financial board may appropriate such money for the cleaning of the teeth of the children, providing the consent of the parent or guardian of the child be first secured.

That last clause would really have nullified to a great extent the educational work of the hygienist in our public school system. If it had been necessary to get permission from each parent before these prophylactic operations could be performed, it would have destroyed to a great degree the very object which South Manchester meant to bring about, and they not understanding that phase of it, we went before the Committee on Education to explain to them the necessity of eliminating that last clause.

At the present time, in Bridgeport, we are taking care of 20,000 school children, and it would have been impossible to take care of one-quarter of them if it had been necessary to get the parents' consent. Our work has gone to a point where we know the parents understand very little about it, and for that reason we would be handicapped. We had a hearing to explain that clause, and it will be rectified. Aside from that, the Legislative Committee have nothing to present of interest for this year.

On motion, the report was accepted.

The Secretary read a letter from the American Defense Society, addressed to the secretary of the Connecticut State Dental Society, in reference to opposition to German-made goods.

Dr. RULE. I move that the chair appoint a committee to draw resolutions in regard to the communication received from the American Defense Society, and that the chairman announce his committee this afternoon. (Motion carried.)

The meeting then adjourned to 1.30 P.M.

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**TUESDAY—Afternoon Session.**

The meeting was called to order by the Vice-President, Dr. Leonard.

Dr. Leonard introduced as the first essayist of the afternoon session Dr. PERCY R. HOWE, Boston, Mass., who gave a demonstration of the silver nitrate method of "Treatment of Root-canals." (This paper is not republished for the reason that it is practically the same as that published in the DENTAL COSMOS, Sept. 1917, p. 871.)

Dr. A. J. CUTTING. I believe the National Dental Association held one of its annual meetings in Boston, and I think that association will be glad to come again in 1920. Dr. Boardman of Boston is extending an invitation to them to come, and I would like to make a motion that we also extend to the National Dental Association an invitation to meet in Boston in 1920. (Motion carried.)

The chairman appointed the following as the Nominating Committee: Dr. Bryant, Dr. Ganung, and Dr. Riggs.

The chairman, Dr. Leonard, then introduced Dr. BRACKETT of Newport, R. I., who addressed the society on the subject of "Some Suggestions in Practice."

The meeting was adjourned to 8 o'clock, the remainder of the afternoon being devoted to clinics.

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**TUESDAY—Evening Session.**

The meeting was called to order by Dr. Leonard, chairman, at 8 P.M.

Dr. A. W. Crosby of New Haven, addressed the meeting on the subject of the Preparedness League, as follows:

Dr. CROSBY. The matter I wish to bring to the attention of this society is

one that I have been asked to speak on by Dr. J. Wright Beach, whom you all recognize as the president of the Preparedness League. The activities of the League in general are over, but there has been a matter brought to the attention of the American dentists lately in which a great many of the men are very much interested. In the devastated districts of France and Belgium there are many dentists who have lost not only their practice, their equipment, and their homes, and in many cases members of their families, but they themselves have been more or less incapacitated for the pursuance of their practice. Of these men who have received such small pay in the army, very few have much chance of starting their practice over again, unless there is some assistance from outside. There has been a fund raised of 110,000 francs, which amounts to \$22,000, mainly from the French dentists themselves to assist their *confrères*. That fund has been used to purchase instruments and equipments, and as soon as the men have had the opportunity to get on their feet they have paid back a part of this sum, and it has been turned over to someone else to give them a little help and encouragement. This movement also has the backing of the National Dental Association.

Such men as Dr. Villain—whom some of you have heard and who has done such wonderful service in France—have indorsed this movement. Dr. Villain himself has given his note for \$1,000, which the banks have discounted so he can pay \$200 a year for five years. He has done a really generous thing, and has also contributed his services and time to the army. I feel that this society, when appealed to in this way—and I understand the treasury is in a position to do it—ought to contribute liberally toward putting these men on their feet.

Dr. MURLLESS. It seems to me as though it were only a humane measure to help these men who want to be self-supporting, and wish to take up the burden of life actively and efficiently again. I move you that this society ap-



appropriate \$500, to be paid to Dr. Crosby as the representative of the Preparedness League, for this purpose.

The motion to contribute \$500 was carried.

Dr. CROSBY. I have had two private subscriptions of \$25 each, and shall be glad to receive from individuals donations to this fund, as well as from the society. I thank the society for their generous response.

The chairman next introduced Dr. FRANK J. ERBE of Waterbury, Conn., who gave a lecture on "Root-canal Treatment Aided by Dental Radiography."

[This paper is printed in full at page 194 of the present issue of the DENTAL COSMOS.]

The next item on the program was a paper by Dr. PAUL R. STILLMAN, New York City, entitled "A Biologic Aspect of Periodontia."

[This paper was printed in full in the DENTAL COSMOS for September 1919, vol. lxi, p. 853.]

#### DISCUSSION.

Dr. R. M. Gaylord, New Haven. Sometime ago I had the pleasure of taking a course in periodontia under Dr. Stillman at Columbia University in New York City, and it is at his personal request that my name has been placed upon the program.

As the work in periodontia begins to unfold, as the cases which I am treating begin to recover their health, it at times appears to me that the whole problem of periodontoclasia is far more simple than many of us have believed.

Periodontia has so gripped my interest that I am, like many another beginner, almost ready to believe that periodontia is what I used to think dentistry was. Now I think every other branch of dentistry is but a specialty of periodontia; at least, so it begins to work out in my own practice.

This paper has one important practical thought. It is this: Never attempt to treat any case, as Dr. Stillman has told you, until you can make a diag-

nosis, for diagnosis is the secret of success in this work. Most of the cases which I have seen have had but two factors, traumatic occlusion and an infected root pocket, and the point which Dr. Stillman brings to you tonight is that at times one of these two factors is of more importance than the other. When we can determine which should first have attention, we exemplify the truth of the old adage, "Well begun is half done."

I did not realize that I already knew so much biology as Dr. Stillman makes me believe I know. If biology is just life and the study of growing things, we all must know far more practical biology than we realized. It is one thing to know a thing, however, and quite another to make a practical application of it in everyday work. In periodontia we realize how powerless are our efforts unless the force which nature supplies comes to our aid and makes the changes from disease to health. We can any one of us make a denture, but no man can make a cure. We can treat cases forever, but if we do not interpret nature's needs and supply them by giving such assistance as she asks, we will never have the pleasure of observing cases cured.

Dr. Stillman (closing the discussion). I have with me a lantern slide of a chart which is the work of Dr. John Oppie McCall of Buffalo, N. Y. This chart shows in a most comprehensive way the many etiological factors which at one time or another go to make up any case of periodontoclasia. It is built upon the plan of a genealogical tree. While Dr. McCall permits me to show the chart, it has never as yet been published, and when it is published, it will be given to the profession by Dr. McCall himself. It is intended to include, and so far as my own clinical experience goes it does include, all of the etiological factors concerned in the breaking down of the supporting structures of the teeth. Etiology has been the stumbling-block in the treatment of periodontoclasia since the days of your eminent colleague, Dr. John M. Riggs. The difficulty was in establishing the

culpability of some one supposedly universal etiological factor. Now we recognize that there are many factors, and we have here a bird's-eye view as it were of the entire field. There are many causative factors, and they may be observed clinically in an almost endless variety of combinations.

Fundamentally they fall into two great classes, viz, "Primary," or inaugurating, and "Secondary," or non-inaugurating. The "Primary" factors are usually the important ones in both etiology and in treatment of this condition. On the other hand, no primary factor is capable in itself of causing a dental periclasia, unless aided by one or more secondary factors. Thus we see that etiology becomes at once compound, and to one unaccustomed to observe closely the several periods in the development of this condition, this is somewhat confusing.

We all recognize the fundamental principle in pathology that susceptibility to infection depends primarily on lowered resistance. This holds true in the periodontal tissues as it does elsewhere in the body. The tissue tone must be lowered to a point where immunity is unable to control or repel invading bacteria. So in periodontoclasia, whenever infection plays a part there must be, and are, at least two factors involved in the etiology. As a primary factor we have "mechanical irritation" as the usual conspicuous feature, but the suppurating type cannot be produced by this factor alone, since there is always the factor of leucocytosis in all pus cases. It also holds true when we consider those types which exhibit no evidence of bacterial invasion of the vessels. A primary factor of inflammation, such as mechanical irritation, will not cause infection, for we know that infection may only be set up by the implantation of parasitic organisms, such as bacteria.

When I first read this chart over I observed to myself, "Dr. McCall surely cannot mean irritation as a primary factor; he must mean inflammation." Then I thought, "Where have I ever observed an inflammation which was not

preceded by an irritation?"—And I never have.

"Injury to the pericementum" leads to malocclusion and "traumatic occlusion."

People who have normal occlusion through their whole life may have the teeth become mechanically out of harmony, exactly as any other mechanical thing which wears upon itself, like the valves of your car. They have to be co-ordinated. As the teeth begin to wear, they lose the power of function, they no longer work normally—they "knock."

"Traumatic occlusion" is also due to "restorative defects." "Defective occlusal surfaces," which might mean defectively carved crowns and defectively carved inlays. Perhaps those not sufficiently carved, as those carved with a wet pledget of cotton and a burnisher, or perhaps one to which a great deal of attention has been given with the idea of making it "like a tooth," but not like the particular tooth.

We have "defective lingual and labial attachments." We have "clamps and clasps" which go far down and impinge into the subgingival space. We also have "congenital abnormal tooth form." One of your members came to me with a very unusual congenital malformation. The two lower central incisors were oval in form, more perhaps like a grain of oats than a tooth.

We too have "habits of occlusion." People frequently have a habit of twisting their jaws. I accuse patients, and they say invariably, "I never had my jaw in that position in my life." I treat the condition and then the next time they say, "Do you know I must have had that habit, because I try to do it now all the time, but I find I cannot do it any more."

Next we have "injury to the cervical fibers." The pericementum seems to be almost one continuous organ or tissue, interlocking and interlacing all of the teeth in the jaw. It rises out of the border of the alveolus, and is attached to the alveolus and to the cementum. The pericementum of two upper molars, for



instance, might be and frequently is a continuous structure. These teeth are actually laced in, and when we have traumatic occlusion, a constant abnormal pounding, those fibers break down, and after they break, infection follows and then the support or the lacing gives way.

"Surface abnormality" includes the "hard and soft deposits" and the "rough enamel surface."

The hard deposits include "salivary calculus" and "serumal deposits."

The soft deposits include food debris and what Black terms "materia alba"—a white material.

"Restorative impingement" I saw at the clinic today; the restoration extended out of the tooth like a cork out of a champagne bottle.

Here we have "trauma" alone, "extra-oral trauma," injury from "food impaction" and "defective approximal contact," natural or restorative.

Where food becomes impacted we have the "meat hole," and with that we have the tooth-quill habit. I have seen the tissue lacerated by the constant use of a quill to such an extent that it appeared to have been cleft almost to the depths of the root.

Dr. Gaylord, who discussed my paper tonight, has a copy of this chart, and he checks cases, and makes diagnoses from it. He has pasted it on a heavy cardboard. Later this chart will be published. Dr. Stevenson, secretary of the department of Extension Postgraduate Teaching in Dentistry at Columbia University, has had it printed, and made this lantern slide.

**Dr. Erbe.** How do you handle those food impaction areas or food pockets that you speak of? I have had a great deal of trouble in eliminating them. Sometimes I have made contour restorations, and even then it would not overcome it. Sometimes I have enlarged the space without helping the condition. They give me a great deal of trouble, and I wish you would give us some light on that.

**Dr. Stillman.** I have had exactly the same experience. The first thing to con-

sider is why this space has developed. If a food pocket has developed through the improper contour of an amalgam filling, for instance, or two proximal amalgam fillings, one of them may have a flat proximal contact point surface that will start it. If it is due to a drifting of the tooth, you should enlarge the contour, with the hope that the drifting will not continue, and then see that the occlusion is co-ordinated and that the occlusal surfaces of the teeth are passing as the blades of a scissors pass, not knocking and pounding the pericementum. In many cases I have utterly failed to correct these conditions due to a previous loss of proximal tissue, but one does not like to talk of his failures.

The "blood supply" and the "functional insufficiency" we saw in the case this afternoon.

"Insufficient toothbrush massage" applies also to the case we saw this afternoon.

Then there is "lymphatic insufficiency" the improper or inadequate scavenging of the tissues, an improper carrying away, not alone an obstruction in the venous circulation.

I think so much of this chart that I think it will hold its place, and do a great deal toward clearing up confusion in etiology. I suggested to Dr. McCall to make this chart, but did not think it could be done. I said, "Make it in the form of a pedigree." He took every single true factor that any other man had observed, and compiled them. The observation of many men in many papers has been as stated. They would say, "This is the important thing," and it may have been, in that particular case; and through loose thinking it seemed to them to be the only important factor in every case.

**Dr. Brackett.** I would like to see two points emphasized. I think one of them was intended to be included, but it was not made so prominent as it should be. They both come partially under the head of disproportion between the supply of nutritional elements of the body and the elimination of the waste products. Here is a typical case, let us



say, of a glutton (this is an actual case), of a man so devoted to the pleasures of the table that he spent one and a half hours at each of four meals each day, consuming an enormous quantity of food, and perhaps I am exaggerating if I say a quart of red Burgundy wine with each meal. With that surplusage, with a comparatively inactive life, the disproportion and the extraordinary tax upon the system was a contribution to a manifestation of disease of this type that was most impressive, and I suppose there is no question that the man ultimately lost his life from this maintained disproportion.

**Dr. Stillman.** Were the symptoms expressed in the gingivæ?

**Dr. Brackett.** Yes, in the oversupply of blood, a plethora that was expressed in the gums, and a very extreme congestion—congestion is not a sufficient word; a plethora of blood in the gums, distention in the mass of the gums, a free bleeding on the slightest touch; a manifestation from the disproportion between the amount of nutrition supplied to the system and the system's ability to dispose of it.

**Dr. Stillman.** We have it here in the chart. You have explained some of the things that I did not mention, but you will see it is in the chart. I did not enlarge upon those points.

**Dr. Brackett.** I wanted it emphasized more because I think there are large quantities of waste within the colon, as the essayist did say in so many words, and then also it seems to me a waste of a character that should be eliminated through the kidneys. It seems to me, as is thoroughly well known by the person who prepared the chart, that the failure of the elimination of waste material from the kidneys is something with which reckoning should be made. It hardly ought to be brought in here perhaps, but the relation between kidney disease and mouth disease operates in both ways.

In the city of Indianapolis some years ago, a group of physicians, a dentist, and a chemist demonstrated that within a period of about six months something

like a score of cases of kidney disease subsided of themselves without other treatment, when the mouth had been restored to a state of health.

**Dr. Stillman.** It has been my clinical experience that these plethoric cases, where the gingiva was engorged, did not respond to treatment as do those of the ischemic type. Kidney disease undoubtedly influences prognosis in every case.

**Dr. RULE** moved a rising vote of thanks to **Dr. Erbe** and **Dr. Stillman.** (Motion carried.)

Adjourned until 9 o'clock Wednesday morning.

#### WEDNESDAY—Morning Session.

The meeting was called to order at 10 o'clock by the chairman, **Dr. Leonard.**

The committee appointed by the chairman in reference to the letter on "No German Goods" question made the following report:

The Connecticut State Dental Association, having received a letter from the American Defense Society, Inc., relative to the crimes of every kind committed by the government and people of Germany, and the above letter having been read and discussed, and,

*Whereas*, we believe the six points of opposition set forth in the above letter to be well founded upon facts; and,

*Whereas*, the dental profession in the past has been using a large amount of material, instruments, and equipment "Made in Germany," and,

*Whereas*, we now know Germany with its hellish Prussianism to have concentrated all of its forces in endeavoring to crush under its military heel the independence of liberty-loving humanity; therefore be it

**RESOLVED**, That we, the members of the Connecticut State Dental Association, in convention assembled, do hereby pledge ourselves that during the next twenty-five years hereafter, we will not knowingly use any materials, supplies, or equipment made in or supplied by Germany; and we urge other lines of business to co-operate with us in this effort to bring the German Government to a realiza-

tion of the tremendous magnitude of her offense against the civilization of this age; and be it still further

RESOLVED, That the secretary be instructed to have these resolutions printed in sufficient number to mail two copies to each dental practitioner in Connecticut.

(Signed) O. T. RULE,  
For the *Committee*.

Dr. RULE moved the adoption of the resolution. (Motion carried.)

Dr. LOEB. In the West, at the present time, there is quite an educational campaign going on in various states, particularly in California, by the advertising dentists to educate patients in every way. As a result, the ethical men of California—the State Dental Association—have organized a dental propaganda campaign for the dissemination of proper dental knowledge.

I would move that the chair appoint a committee of three to co-operate with the State Board of Health, and endeavor to bring the matter of the proper care of the teeth to the attention of the public in this state. This could properly be done by the circulation of articles simply and intelligently written, which very likely every newspaper in the state would be glad to publish, particularly those in the interior, where as a rule the people do not get first-hand information. (Motion carried.)

The Committee on Nominations presented the following nominations for officers:

*President*—Geo. S. B. Leonard, Mystic.

*Vice-President*—Frank J. Buchanan, Waterbury.

*Secretary*—Morton J. Loeb, New Haven.

*Treasurer*—J. F. Barton, Hartford.

*Executive Committee*—Ralph J. Keeler, New London, C. F. Gibbs, Bridgeport, and A. B. Holmes, Waterbury.

*Editor and Librarian*—O. T. Rule, Stamford.

Dr. D. W. Johnston took the chair.

Dr. Rule declined the nomination of librarian and editor.

Dr. LEONARD nominated Dr. Charles McManus of Hartford, in place of Dr. Rule.

Dr. BECKWITH-EWELL moved that the report of the Nominating Committee be accepted, with the exception of substituting the name of Dr. Charles McManus in the place of Dr. Rule as editor and librarian, and that Dr. Bryant cast one ballot for the nominees as presented. (Motion carried.)

The chairman appointed Dr. Bryant to conduct the newly-elected president to the chair.

The meeting then adjourned.

# The Eastern Association of Graduates of the Angle School of Orthodontia.

Tenth Annual Meeting, held in New York City, May 5 and 6, 1919.

The tenth annual meeting of the Eastern Association of Graduates of the Angle School of Orthodontia was held on Monday and Tuesday, May 5 and 6, 1919, at the Vanderbilt Hotel, New York City.

## MONDAY—*Morning Session.*

The meeting was called to order on Monday morning at 10 o'clock, by the president, Dr. H. K. Hatfield of Boston, Mass.

The Vice-President, Dr. A. L. Johnson of Springfield, Mass., took the chair, while the president read his address.

## President's Address.

By HUGH K. HATFIELD, D.M.D., Boston, Mass.

The Eastern Association of Angle Graduates holds today its tenth annual meeting, and a hearty welcome from the society is extended to all its members, guests and friends. The society at the same time extends to its president the privilege of addressing you, a time-honored custom still retained, strangely enough, while orthodontia in its modern trend shakes off so many of its old traditions and ideas. However, the custom may be a wholesome one, for while in intimate touch with the doings of the society during his incumbency, the president has the opportunity to denounce the iconoclast and expose all treason, should the foundations of our specialty be threatened.

The occasion for such action, happily, has long since passed, and instead one notes with considerable satisfaction the growing interest and earnestness of the

members and the society as a whole enthusiastically devoted to the pursuit of some new truth. There may have been a time when a discussion of our shortcomings and difficulties would have been looked upon as a needless disturbance of a fairly satisfactory routine, but a scientific spirit prevails now, which prizes candor, thoroughness, and accuracy, and can distinguish the sharp difference between beliefs and knowledge. This spirit excludes the dogmatic and closed mind, which assumes that it already possesses all essential truth, and is entitled to the exclusive interpretation of it. One of our leading medical authorities has stated recently that, "One of the striking features of the phenomenal development which medicine has undergone in recent years is the diminishing emphasis laid on it as an art and the increasing emphasis laid on it as a science."

It is very easy, however, to delude ourselves with the thought that much is already known, and that we are following with the crowd while innumerable unanswered or partly answered questions lie on all sides of us, to which satisfactory replies must be obtained in order that progress may be made.

In orthodontia it may be gratifying to review the progress made in recent years, but while in the face of such success self-congratulation is permissible to us, self-complacency is not, for the great gaps and deficiencies in our fundamental morphological and physiological knowledge cannot be denied.

My limited knowledge and the confines of this address will barely permit the briefest suggestion of the nature of



these problems. The solution of many of them seems nearer and the outlook more encouraging as the mechanical conception of orthodontia gives way to a more comprehensive understanding of our work and the physiological nature of malocclusion becomes more apparent.

If we could believe that the final and successful result in orthodontic treatment depended solely on the force of occlusal contact to maintain the teeth in their normal relations, by assuming the mechanical relations of the teeth in occlusion to be the *dominant* factor in establishing and maintaining the form of the dental arch, a more definite prognosis might often be given. But a conscientious study of the development which takes place in our cases after the retaining appliances have been removed will afford sufficient evidence that the mechanical conception is too narrow. We refer to our classifications of malocclusions as though they were symptoms of a certain specific disease, to be treated in a specific manner, whereas careful observation many times might have revealed signs of a deranged physiologic mechanism requiring corrective measures differing radically from the routine or conventional methods.

The difference in response to treatment of cases classified as the same signifies the presence of more fundamental diagnostic signs than the occlusal relations of the teeth. The contention is not that the individual's normal occlusal relations should be valued less, but that we are *also* concerned with other causes and factors that have produced the malocclusion and are responsible *for maintaining it, in addition to occlusal contact.*

Successful treatment will depend on the degree in which these forces are changed, be they functional, nutritional, hereditary or whatever their nature, and not on the years of retention.

Regarding *early treatment* there are many different questions and many different replies. The question of diagnosis is a difficult one, as it is impossible at times to distinguish a pathological condition from a normal physiological variation, for the limits of the one

blends with the limits of the other. To base indications for treatment, however, on chronological age alone seems scientifically unsound. It is an established fact that physiological age is a surer expression of a child's development than his age in years, which means that all children do not attain the same development or pass through the same physiological state at the same time. The degree of development which one child may have attained at the age of six may not be reached by another child until the age of seven or eight. Growth in any part is not continuous but intermittent. It may be inhibited or retarded and resumed again at an accelerated rate, and in this connection the advisability of stimulating growth at a time when the growth processes are most active might profitably be investigated.

It is an unfortunate situation and handicap for the busy orthodontist which keeps his attention always focused on the abnormal. If he does not see it, he anticipates it, and his knowledge regarding the changes which take place in development without interference is small. As our knowledge of these growth processes increases and the nature of the forces controlling the form of the dental arch are *better* known, there is a tendency to interfere less with the natural phenomena of growth. The result of this again has been the utilization of simpler appliances in treatment, appliances constructed in accordance with physiological principles rather than on a basis of mechanical efficiency.

In general, whatever the treatment, the welfare of the child as a whole should be the first consideration, and I believe that orthodontic treatment should be comprehensive enough to include appliances, education, and surgical measures.

However, the gaps in our knowledge must be filled in, and facts diligently sought for and firmly established, as these are the only foundations of sound reasoning. So the question arises, what should each member of the society do to clear up some of these problems?

The reply is obvious, that each mem-

ber should take a more active part in the collection of information. He should study, observe, and carry out the treatment in each case with a more critical spirit and not in the routine manner as he has done with a hundred other cases, for no two cases are exactly alike, as nature never duplicates her models.

He should extend his knowledge of medical sciences, to find new facts and new points of view, trying always to discover causes and relate them to effects, and to the society, I would suggest that a committee always exist, charged with the duty of arranging for effective presentations of one or another of these perplexing questions, and at a fixed time let the material and information brought to us by the various essayists be more generally discussed, and from their deductions and conclusions make a more direct and intelligent application of their knowledge to our particular work.

This society has a great duty and responsibility, for the standing of our orthodontic specialty will be determined largely by the attitude the society takes toward these fundamental questions, for we are coming into closer contact with students in the other fields, whose horizon is the same, simply viewed from another angle.

#### DISCUSSION.

**Dr. H. E. Kelsey**, Baltimore, Md. I do not believe it is possible to emphasize too strongly the points the president has brought out. One in particular—that we are too much absorbed in the abnormal to give as much attention as we should to the normal growth and development of the child—should be very seriously considered. Our minds become almost perverted over the question of growth and development, because we have to deal almost exclusively with perverted development, and, as he says, it would be a most excellent thing to have a committee which would be a sort of standardizing committee to keep us a little more up to the study of normal conditions, so we would have a better comparison with the abnormal, which we so constantly treat.

**Dr. H. C. Ferris**, New York City. I would suggest that a definite plan be formulated of handling this matter, which seems to be the fault of all our past committees. They expect the members to write a paper for the society when called upon. They leave it until the very last minute, and expect a man to hand in something without any previous preparation. It seems to me if a committee were appointed, they could select members to write on a given subject, or accept voluntary contributions,—a year in advance, let us say, of a certain meeting. All of the societies in the country that are alive are inviting their essayists at least nine months in advance of the time when the paper is to be presented. The essayist could then have an opportunity of studying the subject suggested to him, or which he wishes to present, and it would be greatly to our benefit as a whole.

**Dr. Milo Hellman**, New York City. I wish to congratulate our president for the able manner in which he has focused all our needs and necessities into such a short presentation. I approve of every word he said, especially of the immediate necessity of the subjects which we are to study and learn a little more about. I was never so much impressed with this fact as I was when coming into this room, when I interrupted a gentleman who was talking about the etiology of malocclusion. The gentleman said: "We are having a talk on the etiology of malocclusion, and here comes Hellman. Even he does not know a thing about it." I do not claim to know much about it, but I have been studying it and working along that line.

In response to the mailing out of 1000 charts for a collection of data, I received three answers from San Francisco, and that was the extent to which the members co-operated in this work. I am firmly convinced and believe that no progress will be made in orthodontia unless every one interested in it will take a hand in these problems. There are so many problems to be solved that it behooves every one of us to put his shoulder to the wheel, and push as hard as he can,



if we want to go ahead. The work of one individual, or two individuals will be all right for their own gratification, but will not amount to much as a whole. Dr. Gregory said a lecture is for the lecturer usually, and it is the saying of those who give a paper that they give it for themselves, because they have enjoyed the pleasure of the work, and have reaped the benefit of it; but in order that you may profit by their work, it is necessary for you to dig as hard as they do.

**Dr. A. L. Johnson**, Springfield, Mass. Dr. Hatfield made a very practical suggestion in regard to what may be called an essay committee, but it seems to me we already have a committee which covers that. We have already a scientific committee for that purpose. Our By-laws define those duties.

It has been the custom of the society in the past to ask workers in other fields of science to talk on subjects which we believe are allied closely to orthodontia, and we have had some very good papers and very valuable material has been presented; but it has not been brought directly in practical application to orthodontia, and that must be done by the orthodontist. As Dr. Hellman said, it is our part to make a résumé of the work presented to this society, and bring it home to orthodontia. It cannot be done by outsiders. It must be done by the orthodontist himself.

**Dr. Kelsey.** I would just like to say that if every member of this society, or even half of them, would give one-tenth the amount of work to abstract scientific studies—I mean work which is not actually done at the chair—that Dr. Hellman, or Dr. Johnson, or Dr. Hatfield has given in the last few years, we would have had some of the results Dr. Hellman referred to. I am perfectly willing to accept the statement that Dr. Hellman made, that he has not had the support which he should have had. On one or two occasions I have tried to fill out some charts, but they were very meager, and that is all I have done toward assisting the line of research Dr. Hellman was very ably doing, and he should have had more response.

I will be one of any number of members who will promise to assist Dr. Hellman in any way he suggests. I think it would be a very good idea if a number of men would volunteer to do the things he would like us to do in connection with the research he is conducting. I would say the same of Dr. Johnson or Dr. Hatfield—something by which we would get an individual promise to do some definite work. I am afraid Dr. Hellman's appeal has been made in such a general way, that each of us felt that we could "let George do it," and so nothing has been done.

**Dr. Hellman.** I wish to correct my former statement. Dr. Kelsey was one of those who did respond to my appeal.

**Dr. Johnson.** Can we not pass a resolution now to the effect that the society will back up the efforts of the Scientific Committee?

**Dr. Mershon.** If the Scientific Committee presented work in such a way that the members could act on it, I think something would be accomplished.

President Hatfield then resumed the chair.

**Dr. B. W. Weinberger**, New York. In reference to the president's address, I would like to call to the attention of the members an editorial in the *Journal of the American Medical Association*, on the subject of "Growth." I think if every member would read that, he would find it of great benefit.

The president next introduced Dr. ROBERT H. LOWIE of New York City, who gave a lecture on "Sioux Indians—Their Life and Habits," as follows:

#### Sioux Indians—Their Life and Habits.

By ROBERT H. LOWIE, Ph.D., New York, N. Y.

I shall try to give you some conception of the mode of life, customs and manners of a typical tribe of the Siouan family—the Dakota Indians. When I speak of the Siouan family, I mean a stock of Indians all of whom speak related languages. By this I do not mean that all the Indians of the family



are able to understand one another's speech. For example, students of language consider the Russian and the English languages to be of the same family, that is, descendants of one original form of speech. In the same way, the languages spoken by the Omaha, the Crow and the Dakota tribes are all related; but an Omaha would not understand a single word in a sentence spoken by a Dakota or a Crow. The relationship, in other words, can only be established by comparing in some detail the word-roots and grammatical processes of these several tongues.

The Dakota Indians formed one of the largest of the Indian tribes, and did not form a political unit, but were broken up into a number of distinct bands with separate chiefs. These bands naturally differed somewhat in their mode of life according to their habitat and their relations with neighboring tribes. For example, the Santee, or eastern Dakota, were in contact with the Ojibwa Indians, and shared a good many of the traits of the woodland area. On the other hand, the Teton Dakota in the west were typical buffalo-hunting nomads.

From the standpoint of their historical importance, all of them have played their part. You will constantly find mention of the Dakota Indians, details of their history depending entirely on what section of the country they come from. It is, nevertheless, a curious phenomenon that, in spite of a great deal of sporadic information that has come from the Dakota Indians, there is not a single scientific monograph on these Indians. A great deal has been published about them, but there is not even one authoritative, up-to-date publication that would gather everything together. Take, for example, their religious beliefs; we have had some good special papers recently, but there is not one that will do justice to that entire phase of their life.

However, I shall try to do the best I can, and I will more particularly speak of the western division of the Dakota, the group that Dr. McKay will later speak of and which is numerically pre-

ponderant at the present time. About 14,000 to 15,000 of the 22,000 tribesmen belong to this western division; they are comprised sometimes under the name of the Teton Dakota and are again subdivided, the Ogalala being the most important.

The eastern Dakota are slightly different in one respect; naturally enough, they came into contact with some of the other tribes who were not purely nomadic as the typical western Dakota are. The western Dakota are typical nomads of the Prairie. This means they lived mainly on meat, principally on the meat of certain large mammals. There were, of course, other large hunting tribes in the United States besides those of the Plains, but they hunted mostly small game. That you will find to be the case among the primitive tribes of the Plateau, but the Sioux Indians, to use the popular name for the Dakota, were hunters of large game, and the buffalo was their one most important staple game animal. Even today you will find the older Indians complaining of the very poor substitute and makeshift supplied by the modern cattle for the old buffalo meat. I will speak of other forms of diet a little later on. The elk was hunted, as well as various kinds of deer; but the buffalo was the most important animal.

I should like to call your attention to that part of my talk which will prove most interesting,—the manner in which buffalo meat was prepared and eaten. The buffalo meat was sometimes eaten fresh, that is, they would hunt large herds of buffalo, as I will describe later, and subsequently they would simply gorge themselves with the fresh buffalo meat. However, fresh buffalo meat was not always to be had, consequently there were extremely important devices for making a kind of preserved meat. For one thing, the meat was cut into long, thin strips, and dried on meat racks; but more important by far was the preparation of what is known as pemmican. Pemmican was made by a special process. The dried meat was minced and chopped up into small bits.

and mixed with various kinds of fat taken from the buffalo. Tallow and bone marrow, which they extracted from partly broken bones, was heated over a fire, and this animal fat was thoroughly mixed with the minced meat. Then there was an additional ingredient employed, namely, wild chokecherries pounded up with the meat bits. That process you can still see at present on some of the Indian reservations. You can see a woman taking a stone boulder for a mortar, using another stone as a pestle, and pounding the berries up, making long drawn-out cakes of this mixture. In the preparation of pemmican, this material all pounded up was employed as part of the mixture. When the mixture was finished, they would put it together and place it in large receptacles. These were made of rawhide, by the women, and folded over in two flaps, in the way the druggist folds his powders. These receptacles were painted by the women, this being altogether their work. They played rather an important part in the industrial life of the Plains Indians, as they did in many other communities.

Pemmican was important, because fresh meat was not always to be had. We have records that some of the Indian tribes, among them the Dakota, would sometimes go as long as six or seven months without any other kind of food practically, except meat diet—sometimes fresh meat, eked out with this pemmican, which after it was stored in these receptacles was quite ready for use.

Buffalo meat was not the only kind the Plains people had. They used elk meat and venison, and then they did not absolutely despise vegetable food. In fact, the very circumstance that they used chokecherries indicates that they had some use for plant food. However, this food had very little importance for the nomadic Plains populations. There were other Plains tribes who led a sort of semi-sedentary life, and the eastern Dakota somewhat shared their culture. The western Dakota, however, were essentially meat eaters, and that I think is the essential point for you.

Fish was on the whole despised by the majority of the Plains Indians. The Omaha, who belong to the Sioux family, although quite different from the Dakota, did use the fish from their rivers, but the Dakota did not like fish. Even today I do not think they take to them; they naturally prefer beef, since they cannot have buffalo meat.

As for plant food, there were a number of roots that grew wild, which these nomadic tribes did not disdain. The principal kind was referred to as a wild turnip, or wild carrot. The botanical name is *psoralea*. The taste is rather good, at least it is not unpalatable. This part of the diet was supplied by the women. The men did the hunting, and the women would dig up this root with their sticks.

Dr. Washington Matthews, who was the government surgeon on various reservations, among whom were the Hidatsa Indians of North Dakota, in writing upon the diet of Indians as far back as 1877, expressed the opinion that it is possible for them to subsist in perfectly good condition on a practically exclusive meat diet.

#### METHODS USED IN PROCURING BUFFALO MEAT.

How did the Indians get their buffalo? You must remember that the horse, which was used in later times by them in hunting buffalo and other game, was introduced by the whites. Those of you who are acquainted with the fact will pardon my mentioning it, but I find that many people do not know that the horse is an introduced animal, as far as America is concerned. The horse in the dim geological past was a native of America, but during the human occupation of the continent, the horse did not exist here; consequently every horse used was the descendant of a horse brought here by the Spaniards and other discoverers. It was not an easy matter, therefore, to hunt the buffalo, and the Plains Indians adopted certain devices which were extremely ingenious. One method employed with good effect so far



as the buffaloes were concerned, was used 20,000 or more years ago in Europe. In certain parts of Europe you will find hundreds of thousands of horse bones. What the Solutreans did, as the people of that period are called, was to select certain prominent cliffs, then get back of the herd of horses, drive them ahead, and make these animals leap down the precipices, when they would become mutilated or disabled and unable to make their escape, whereupon they would kill them outright. That was the method employed by these Indians in hunting the buffalo. Sometimes they would improve on this device. They might not perhaps have a sufficiently high cliff to work with, so they would construct a sort of corral at the bottom of a fairly low cliff and spread out a sort of fence which would be extended for two or three miles, not as a permanent enclosure, of course, but with interstices which would be occupied by Indian men, usually old men, or sometimes women and children, who would wave blankets. Then the hunters would get behind the herd and drive them down into this funnel until they got to the narrow spot which was at the edge of the abyss, and the buffalo would jump down and be impounded in the corral. There they would wheel around and around without making any effort to escape, although if they had attempted to do so there were Indians stationed around the corral, and it would have been difficult for them to get out. Either they were killed by jumping down, or they would be wounded, and then they were dispatched with arrows.

This then was one of the important processes for hunting their game, and it depended very largely on communal undertaking. One man alone would have no chance at all. It was, however, in some instances customary for small groups of two or three to hunt the buffalo. They would assume a disguise in that case. Some of the older artists have given us pictures showing how an Indian would put on the head of a wolf or a coyote and sneak up to a herd of buffalo, and with his bow and arrow pick out the individual animal he wanted to

dispatch and, letting fly his arrow, bring down his quarry. These were the principal hunting methods.

Passing on now to certain other phases of the life of these people, the buffalo was not only the animal that supplied the Indians with food, but also furnished a great variety of other things which were used in their economic or industrial life. The covering of their tents or lodges was made from buffalo hides, sewed together and made into a complete cover for a conical structure. These tents were used by all the Plains tribes, even up to northern Canada, where they used moose or caribou skins as covering. The cover was decorated on the outside, and the women put up the tents and took them down. The transportation of the poles of course was greatly facilitated by the use of horses when they were introduced. The only other aid in transportation was the dog, which was originally the only domesticated animal in North America and was used as a beast of burden. The Dakota had two poles fastened at the ends to the back of the dog, while the two other ends dragged along. They would attach some sort of square netted framework, and to this they attached their bundles, sometimes weighing as much as 50 or 60 pounds. I have seen an old woman who played with her little grandchild, a little boy, strapped to this framework, which was attached to a dog. There is an amusing myth, common to many of the Plains Indians, that on one occasion the people were on the march, and a baby was being transported on one of these frames, when the dog saw a jackrabbit and gave chase to it, dashing away with no regard to his burden. The infant fell off, and the story goes on to tell of all sorts of adventures that befell the child.

The prominent mode of habitation was then this tipi or tepee, as the Dakota called it, *i.e.*, the conical skin lodge.

#### INDUSTRIES.

Industrially, the women played a very important part among these tribes. For



example, all the skin-work, which means all the clothing, was manufactured by the women. Furthermore, the women prepared all the food, except when the men were on the warpath. Since these were purely nomadic tribes, it might occur to you that they had difficulty in boiling food for lack of pottery. There was a period when many of the Plains Indians led a semi-sedentary life, and these must have had pottery. Indeed, pottery remains have been found, very crude but still relics of earthenware vessels. The western Dakota, however, did not have any use for pottery, because they were constantly on the move. Nevertheless they were able to solve the problem of boiling meat by a method which has been called "stone boiling," in vogue among many tribes which lack earthenware vessels. There were really two varieties of this method, one of which was to make a pit in the ground and line it with a skin. Then they would make a big fire and place rocks on the fire to heat them red-hot. They would fill the pit with water and then throw in their meat with the hot rocks, and when the meat was thoroughly boiled, they would take it out. Another variation of this method, which works exactly on the same principle, was to insert four sticks in a square in the ground, and then hang a paunch or fresh skin from those four sticks, whereupon of course it was possible to use the heated rocks as well as with the pit.

Boiling the meat was not the only way of preparing it. The Indians were also addicted to the habit of broiling it directly on the coals, and roasting it on the spit. You can still see them follow that method occasionally, and it is not different from the one we employ on a camping trip when we roast chops over a fire. Though cooking was mainly the work of the women, the men when on the warpath were quite capable of boiling or roasting their meat.

#### SOCIAL CUSTOMS.

To look at certain other aspects of the Dakota, which are perhaps farther re-

moved from your interests professionally, but which are interesting otherwise, they had certain very definite social customs. They were a democratic people, as the majority of the North American Indians were, but they were not devoid entirely of social distinctions. All the Indians I know anything about attach a great deal of importance to social distinctions, but not being hereditary they are democratic in that they depend on the worth of the man. The merits of a man differed according to varying tribal standards and among the Dakota they depended on his warlike deeds. He might have all sorts of requirements in other directions, but he counted for very little if he were not a man of acknowledged valor in battle. There were certain stereotyped deeds which they recognized as heroic. With some tribes it was capturing the scalp of an enemy. Some tribes, including the Dakota, emphasized the striking of the enemy. This was called striking a "coup," which word is derived from the French. If the man merely touched the enemy with a spear, or a club, or his hand, or in any way, even without wounding him, that would score one, as you might say, and ever after he was permitted to boast of what he had done against the enemy. Even today, when there is a gathering of Plains Indians, you will find the old men recounting their "coups," accomplished when they were young. They might begin by saying: "When I was a young man of 25 or 30 (they never knew their exact age) I once went against the Cheyenne Indians. Several of them surrounded me, and I dashed against them and touched one of them on the shoulder with my lance." That is one coup, and usually they are careful not to add any frills, because there are generally present eye-witnesses to the fact. These would not indeed come out in the open and say the narrator lied, but would say privately: "Well, So-and-so is not much of a man. He was lying about his coups." Thus, the liar would come to sink in public estimation.

Social prestige, therefore, was not inherited. The father might have been

a brave man, but if the son did not live up to the bravery of his father, he was looked down upon.

You will never find among the Dakota warriors that the people of distinction are treated by others in the slavish fashion reported from other parts of the world. In Africa and Polynesia, there are certain servile attitudes assumed by the lower classes toward their chiefs or kings, but there is no one who approximates a king among the Dakota and related tribes. There is an easy-going, democratic social spirit. Also, there is really no one who has an absolute power over life and death. No one individual assumes that power, which is in contradistinction to the existing customs in many parts of Asia and Africa.

This brings us back to a subject which I touched upon in the early part of my talk. On one occasion, the freedom of an individual was very much interfered with by a regular police force. Characteristically enough, it was at the time of the big communal hunt that individual liberty was encroached upon. You can see that the success of the hunt depended very largely upon co-operation. If one individual had gone out hunting all by himself, and killed a buffalo or two, but frightened off the herd at large, naturally economic disaster of the people would have ensued; one individual might have got food enough for some weeks, but the whole tribe would have had to suffer. They guarded carefully against this. Whenever a hunt was announced by a crier, then at once the police force began to act and would issue orders from day to day, no individual being allowed to interfere with the general tribal plan. Suppose one man should go out and get several buffaloes; the police would go after him, confiscate the meat and possibly destroy it, and whip him severely, sometimes killing him, and destroying his lodge poles and everything in his tepee. That was the one occasion when there was an extremely severe punishment, and the reason was obviously an economic one. On other occasions the individual was to a considerable degree free to do what he pleased—always with

this modification, however, that he would be looked down upon if he acted contrary to tribal law, for there was an unwritten law which a man would not willingly infringe upon lest he suffer in his social prestige, of which they were very vain.

There are a number of customs which are very interesting. You hear of polygamy as a custom of Indians and other tribes. However, from the fact that the proportion of the sexes is approximately the same everywhere, it follows you can never have a general condition of polygamy in any tribe unless there is an artificial disturbance. The Plains Indians were so warlike that a larger number of men died than women, and the number of women was somewhat in excess of the men. Nevertheless this difference was not large enough to permit polygamy, to say nothing of polygamy on a large scale. The very distinguished men might have two, three or four wives, but the vast majority of the men contented themselves with one woman. There was permissive polygamy, but practically mostly monogamy.

There was a curious rule in regard to polygamy. Several wives of a polygamous man were sisters. If a man married the oldest daughter of a family, he was also permitted to marry the other girls in the family as they grew to maturity. This practice is extremely common, not only among American Indians, but among primitive tribes generally. It is founded on good reasoning, that if a man married several wives who were not related, they would be apt to quarrel together, whereas if they were blood relatives, they would live in harmony.

I should like to call your attention to one aspect of their religious life. The life of the Indians of the Plains, and of certain other regions, was dominated by a belief in visions. To them, dreams were to a large extent a reality, and in a still greater measure certain peculiar hallucinations, which were induced by a lengthy fast. It was quite common for a young Indian about the age of maturity to fast for several days until he had a vision. At first it assumed the



shape of a human being, but after a while the visitant would assume the shape of an animal. It would tell the Indians to get up a certain dance, using a certain costume and step, or to use a certain kind of root to doctor a certain kind of ailment. The Indians believed implicitly in these dreams. The Crow Indians would never go on the war-path unless they had previously been prompted by some vision. There is hardly anything of any consequence in the life of the Plains Indians which was not based directly or indirectly upon a vision, even designs in their handiwork. Designs made in beadwork and in porcupine work would very often come from a vision, *e.g.*, a woman would say a man had come to her and told her to make a diamond-shaped piece of beadwork with two moons on the side.

The medicine men were very much given to speculating about the beginning of things, and they elaborated their thought into a huge scheme of a large number of supernatural beings who would not always harmonize with one another. So far as the individual was concerned, he would pay more attention to what he had personally seen in a vision than to what the medicine men told him. The one outstanding point of their religious life was therefore their visionary experiences.

This is a broad study which has not been gone into very deeply as yet by anyone.

#### DISCUSSION.

**Dr. H. E. Kelsey**, Baltimore. Has Dr. Lowie any information as to the skill of these Indians with the bow and arrow, as related to peoples in other parts of the world, and modern peoples?

**Dr. Lowie**. I think they were very skilful. There is no reason to doubt that their contentions on this point were quite truthful. Sometimes they would have to shoot a buffalo for ceremonial reasons in a certain fashion. They would have to do it in such a fashion that the arrow would not come out at the other end; there would have to be only one hole in the

buffalo skin; and the marksman would have to bring down the buffalo with the first arrow. They were very good archers. You could not have a very fair test, because the white people who came into the country were not as a rule good archers.

**Dr. Milo Hellman**, New York City. In your experience among those tribes, have you noticed nursing women; and when it happens that some of the women become ill and cannot nurse the babies, what happens to those babies?

**Dr. Lowie**. The point is interesting in that Indian children, like other primitive children, are nursed very much longer than our children. I have seen a Navajo boy who was running around, and could not have been less than four years, coming up to his mother to be nursed. I think Dr. Hrdliska has stated that he knew of a boy of about five years being nursed. I think in a case where the mother could not nurse the child, one of her sisters, or one of the other women of the household assumed the duty. Sometimes when the mother died at childbirth, the child was buried with the mother.

**Dr. A. W. Crosby**, New Haven. When the child was weaned, what sort of food was it weaned to?

**Dr. Lowie**. I imagine they had no particular dietary rules, but after the children were weaned, I believe they took the usual meat diet.

**Dr. Kelsey**. From the time those children had teeth, did they not begin to use them, even while they were still nursing?

**Dr. Lowie**. Where the child was four years old, naturally the child did not live only on a milk diet.

**Dr. H. C. Ferris**, New York City. Was there no history of their using goat's milk?

**Dr. Lowie**. They had no goats. There were some tribes who got goats and sheep from the Spaniards, and have been successful in raising them since, but that is not aboriginal, and I have not heard of their using goat's milk even today.

**Dr. Kelsey**. Were they not different



from other primitive tribes, in not having domesticated animals?

**Dr. Lowie.** That is a very interesting question. The Indians of the New World, both North and South America, had only the dog. There was only one notable exception. In Peru, as all of you have read, there were domesticated animals related to the camel, the llama and the alpaca, which were used for the wool they furnished, and also as beasts of burden. That was limited to Peru and countries immediately adjoining. Among the primitive tribes of the Old World, there were great differences. In Northern Europe and Asia the Lapps, Ostyak, Samoyed and others depend on the domestication of the reindeer. Many of them used the milk of the reindeer, as well as the flesh. Then there is the important area where cattle are domesticated. For instance, in Africa, along the southern coast, where there is no pest like a certain fly which makes cattle impossible, occurs the domesticated ox, as among the Zulus.

The Australians had a sort of dog called the dingo. In Polynesia, there are poultry and dogs and pigs, to some extent. In the New World, in North and South America, with the exception of Peru, the dog was the only domesticated animal of any consequence.

**Dr. Sayre.** How do you account for the different customs among the Indians, for instance, the Iroquois, whom the French Jesuits discovered here, subsisting on corn and living in villages? Do you think maize and corn did not grow in the Far West?

**Dr. Lowie.** Right in Dakota there were three tribes that were semi-sedentary for half the year and cultivating corn during that time. Some of the other tribes moved farther and farther West, developed a taste for buffalo, I presume, and found it necessary to become nomadic in order to hunt the buffalo. It seems probable that the Dakota were at one time a corn-growing people. The Ojibwa were very largely a hunting people, but they did grow some corn. The western Dakota finally switched over to hunting entirely. There is one

reason that might be given, and that is, that the Ojibwa, who were the enemies of the Dakota, got possession of guns before the Dakota and drove them farther West. It might not have been so easy for them to grow corn in their new habitat.

**Dr. J. A. Gorman,** New Orleans. Did they mutilate the teeth in any way?

**Dr. Lowie.** I have never heard so.

**Dr. J. Lowe Young,** New York City. In the preparation of pemmican, did they use any condiment?

**Dr. Lowie.** The chokecherries we might consider as such, also the bone marrow.

**Dr. Young.** How fine did they grind the pits of the chokecherries?

**Dr. Lowie.** Very fine.

**Dr. Young.** So when they ate the pemmican, they swallowed the substance with it?

**Dr. Lowie.** Yes.

**Dr. F. S. McKay,** New York City. Which today are the most primitive tribes?

**Dr. Lowie.** That is hard to answer, because those that were the most primitive before, are not so now. Of those I have seen, a portion of the Ute Indians were perhaps the most primitive, living near the "Four Corners"—where four states come together—Colorado, Utah, Arizona and New Mexico. The Hopi and the Zuñi are probably nearer their primitive condition, but their primitive condition was way beyond the primitive condition of other tribes. They were always agricultural. They are able to follow agricultural pursuits today where the white man cannot get crops. If you want to see primitive life today, by all means go to see them, but you cannot say they are the most primitive tribes, because their primitiveness already marked a high stage of development, as far as aboriginal development goes.

The President then introduced Dr. Frederick S. McKay of New York City, who read a paper entitled, "Malocclusion among the North American Indians—The Sioux."

[This paper is printed in full at page

179 of the present issue of the DENTAL COSMOS.]

### DISCUSSION.

**Dr. B. W. Weinberger**, New York City. In the case of the supernumerary laterals, where the lower left was larger than the right, is there a bifurcation?

**Dr. McKay.** No, it was all one. There was perhaps the merest suggestion of a groove, but my recollection is it was all one smooth surface.

**Dr. H. E. Kelsey**, Baltimore. I enjoyed Dr. McKay's paper immensely, and at different times have had a small amount of information from observers along the same line, and always received it with an equal interest, because the subject seems to be one that is very pregnant with etiological possibilities for us. It seems to me the most fertile field for investigation that we have at the present time. I have advanced the theory before that a certain number of children of our own race, of admittedly healthy hereditary birth, might be taken and put in primitive conditions, and the survivors of such a life would present the same excellent development of the denture that the primitive children do. It seems to me that is almost proved, because the converse of it is evidently true from Dr. McKay's paper.

I hope Dr. McKay will find the opportunity to make a very much more extensive and complete examination than he has up to the present time. It certainly affords much food for thought.

**Dr. G. W. Grieve**, Toronto, Can. Dr. McKay said there was but little appearance of tonsil hypertrophy. I presume he examined as well as he could in the limited time at his disposal for hypertrophied tonsils, but his report shows only a small percentage. In the pictures there seem to be quite a large number of open bites, and I find that those cases are nearly always associated with hypertrophied tonsils.

**Dr. Ferris.** Has Dr. McKay any information as to the diet these children are living upon?

**Dr. Gorman.** Did Dr. McKay ex-

amine any of the older persons, 21 to 30 years, and what condition were they in?

**Dr. Howard.** Were the environmental influences the same in all these cases?

**Dr. McKay.** The question of further investigation has been mentioned, and I may say that my appetite has been whetted by this investigation, and I have an ambition, if the circumstances ever permit, to continue it. You can readily see it is a task of somewhat large dimensions from the fact that so many of these tribes are scattered in most inaccessible parts of the country. To reach these Sioux took a journey of half a night in each direction, and in a roundabout way. When we come to investigations of other tribes, those that appeal to me most are some that Dr. Lowie mentioned, the Pimas, the Zuñis, the Navajos, the Hopis and the Apaches.

If this investigation is to be put to practical use it would be in the consideration of this question: Is it possible that we can come close to the dividing line between normal occlusion and malocclusion in two or three generations? In other words, can we not assume that the forebears of most of these children that were shown on the screen were normal? The forebears were not housed in governmental schools, but pursued the kind of life we were told about this morning by Dr. Lowie. Is it possible that putting these children in the present environment brought about these conditions? These children that I examined were taken at random. There were multitudes of them that I could not reach, because they were out on the reservation doing various kinds of farm work, and it would require several days to get in touch with the whole population; but it is a fruitful field for research if we can establish the fact that civilization, so-called, has produced this effect upon people that had primitive forebears only two generations ago.

As to tonsillar and adenoid influences, I did not examine especially for that. I could not help seeing the tonsils, but I could not see the adenoids; as far as my limited observation went I made note

of no tonsillar enlargement. Neither did I see any individual who presented the facial appearance of the typical mouth breather.

As to the diet, these children are in the schools for the largest part of the year. During the summer vacation, they go back to the parental roof, which is not a tepee at all, but a frame dwelling. They are put into school when they are little children, and kept there until they are young adults. I saw some of 21, or thereabouts. What the present diet is in the reservation homes, I do not know; to find out would take days and weeks to go from house to house, but in the school the diet is the same as that in any school. I had the pleasure of dining with them, and I could not see anything different from what the children in the modern boarding school would get. They get sugar and fruit, pie, cake and cookies, bread, meat and vegetables.

The diet of the children at the school on the Pima reservation was much the same. I had dinner there. The only old Indians I saw were at the Pima reservation. They were quite old, and they did not like to show their teeth. The arches were broad and well developed, and the teeth worn down flat. They did not like to be examined. The

young people made no objection to being photographed, or examined. It was something of a lark for them.

These young Indians have all been under the same environment. Assuming that they have been in the school from childhood, which most of them have, until they reach young maturity they are all living under the same conditions.

**Dr. Howard.** I meant what diet did they have before they entered the school, when they were living with their parents?

**Dr. McKay.** They lived much the same as ordinary farmers. I do not know that these children's environment would be much different from the ordinary country children. The point I have been trying to make is that it has been only two or three generations from these children back to savage life, and in that time we come from practically normality to what you have seen in the illustrations.

**Dr. Waldron.** How do you know you had a practical normality three generations ago?

**Dr. McKay.** I do not know it, I assume it only.

Adjourned to the afternoon session.

(To be continued.)



# THE DENTAL COSMOS

A MONTHLY RECORD OF DENTAL SCIENCE.

*Devoted to the Interests of the Profession.*

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EDWARD C. KIRK, D.D.S., Sc.D., LL.D., *Editor.*

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PHILADELPHIA, FEBRUARY 1920.

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## EDITORIAL DEPARTMENT

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### Oral Hygiene as a Public Health Measure.

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WHILE the earliest records of medical thought contain references to the influence of mouth diseases upon the health of the individual, and while the germ theory of disease held sway in the minds of many of the earlier medical writers, it was not until about 1870 that the discoveries of Louis Pasteur and Robert Koch demonstrated the causal relationship between micro-organisms and disease production, when the germ theory of disease ceased to be a theory and became an established fact upon which has been built up the science of bacteriology. From the researches in bacteriology as related to disease causation have developed such practical knowledge as we now possess of modern sanitation, disease prevention and treatment, and successful surgical technique.

Immediately following the demonstration of the germ origin of disease, Dr. Willoughby D. Miller, working in Professor Koch's laboratory in Berlin, conducted a research into the cause of tooth decay or dental caries, as the result of which he was able to announce its germ origin due to the fermentation of food particles by certain micro-organisms present in the unclean mouth. Later (1891) Miller reported his further studies of the germ contents of the human mouth in a series of papers published in the *DENTAL COSMOS* under the general title "The Human Mouth as a Focus of Infection," in which he showed conclusively that between sixty and seventy different varieties of germs were constant inhabitants of the mouth and that a considerable number of these were the exciters of disease conditions when circumstances favored; that disease-producing germs could be transmitted through the circulation and lymph tracts to remote parts of the body and there set up independent disease reactions, and that the unclean or unsanitary mouth is the most prolific breeder of the infectious type of germs under consideration and is, therefore, a constant menace to the health of its possessor.

The publication of these important scientific findings pointedly drew the attention of the dental profession to the importance of mouth cleanliness as a measure for disease prevention, and an organized effort upon the part of the dental profession was instituted to bring the subject to the attention of the medical profession and the public.

It was some years, however, before this organized effort to educate the medical profession to an appreciation of the relationship between mouth disease and systemic conditions produced any noticeable result. Probably the first important public expression of the effect of these efforts was given by the late Professor Osler, Regius Professor of Medicine at the University of Oxford, in an address delivered before the graduating class of the Royal Dental Hospital, London, in 1905. In this address Professor Osler said among other things that the dentist must be a propagandist for the betterment of public health: "(1) By advocating the cult of the toothbrush, to the end that the mouth and its contained organs may be kept more generally in a clean and hygienic condition. (2) By the routine inspection of the teeth of school children. (3) By persistently educating the public along these lines

so that better nutrition and consequently better health may be secured to the public."

In commenting upon Professor Osler's address at that time, we said:

Dentistry has sung this same song through the whole gamut, in tones like the roaring lion and in the gentle cadences of the sucking dove, and is still lifting up its voice to the same theme; but the public ear is guided in matters of health, even the health of the teeth, by the advice of the physician, for he speaks with authority, and, in the case of the teeth, usually with more authority than knowledge. Hence arises the difficulty which confronts the dentist in impressing the public mind with the truths advocated by Professor Osler. But the truths even of dentistry ultimately prevail, like all other truths, and no small evidence of that fact is furnished by the vicarious triumph which some of our elementary dental contentions have achieved in respect to an appreciative public hearing through their advocacy by the Regius Professor of Medicine of the University of Oxford. From which we reach the conclusion that in order to most effectually convert the public to the ways of dental rectitude, we must begin by converting our medical *confrères*.

As though in fulfilment of what seemed to us as prophetic at that time, it was Sir William Hunter, a physician and lecturer on pathology to the Charing Cross Hospital, London, whose condemnation of what he termed "septic American dentistry," in an address delivered at McGill University, Montreal, in 1910, aroused the medical profession, and through them the public to the importance of a consideration of mouth conditions in relation to bodily health. It may now be said there is abundant evidence to show that our medical *confrères* are converted, and in many instances they appear to be over-converted, if we may coin that term, so much so that we are reaping a harvest of ruthless extraction of teeth, diseased and otherwise, in the hope and expectation that many puzzling and refractory systemic conditions will be eliminated.

We are of the opinion that this *spurlos versenkt* program for the unrestricted extraction of pulpless teeth is mainly due to lack of knowledge of the therapeutic resources of operative dentistry upon the part of those who, be they either medical or dental, authorize tooth extraction as a routine procedure.

From whatever angle we may view it, the extraction of a tooth is the practical confession of a therapeutic failure, and as the principles of scientific root-canal sterilization and treatment become



better known, we shall save and make serviceable these important organs and will then regard their extraction without proper justification as malpractice.

The first definitely systematic effort to publicly demonstrate the economic value of oral hygiene as a public health measure was made under the direction of W. G. Ebersole, D.D.S., of Cleveland, Ohio, who organized a practical test of the relationship of mouth cleanliness to bodily health in one of the public schools of that city, the results of which proved conclusively the direct connection between a clean, healthy mouth and teeth, on the one hand, and the physical and mental efficiency of the child on the other.

More recently Dr. A. C. Fones of Bridgeport, Conn., organized a practical test of oral hygiene in the public schools of that city, which has continued over four years, the results of which have just been tabulated. These show in an almost dramatic way the improvement in health conditions and scholarship that has been achieved simply by securing for the children freedom from mouth infection and dental disease.

The most striking demonstration of the fundamental importance of oral hygiene as a public health measure is furnished by the experience of the world war. Twenty-five per cent. of the otherwise eligible manhood of the nation was rejected for military service by the recruiting medical officers by reason of physical defects, and of those so rejected a very large proportion was on account of dental disease or disability. So important was a healthy mouth and teeth in the soldier regarded by the military authorities that the National Government made provision by law for the dental care of all of its troops. In short, the government practically recognized that dental defects or an infected mouth in the soldier are a source of disability that operate as disastrously in national defense as any other physical disability which reduces or neutralizes the fighting efficiency of the men.

So that oral hygiene has been proved to very definitely play a most important rôle in the world's health. The question of the direct connection between a healthy mouth and sound bodily health is no longer debatable. The immediate problem, which is now pressing for solution and is engaging the attention of dentists, physicians, sanitarians and school authorities the world over, is how to bring the benefits of oral hygiene within practical reach

of the general public and more particularly of the rising generation of school children.

The medical profession particularly is wide awake to the importance of oral hygiene as a public health measure and also to the fact that the dental profession as now organized is numerically physically unable to adequately cope with the situation. At best the dentist can only take a directive and consultative attitude toward it, for the reason that his time is fully occupied with relief and restorative work. The present forms of dental legislation are not applicable to the advanced thought of public dental service as a health measure, for they were conceived before the present humanitarian aspects of dentistry were ever thought of. Other means will have to be developed and they logically fall within the scope of the health administrative authorities of the city, state, and nation.

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#### **Death of Dr. Henry W. Morgan.**

WE regret to announce the death of Dr. HENRY W. MORGAN of Nashville, Tenn., on January 17, 1920. A full obituary notice will appear in the March issue of the DENTAL COSMOS.

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#### **Death of Dr. B. Holly Smith.**

WE regret also to announce the death of Dr. B. HOLLY SMITH of Baltimore, Md., on January 22, 1920. A full obituary notice will appear in the March issue of the DENTAL COSMOS.

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# PRACTICAL HINTS

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This Department specially welcomes the brief presentation by our readers of any novel suggestions or methods which in their own practice have proved to be time-saving or to possess other features of advantage.

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## Cyanosis.

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By EDWARD H. B. BOWNE, D.D.S., Kingston, N. J.

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THE sudden appearance of cyanosis during the administration of nitrous oxid or chloroform is a most dangerous symptom and the anesthetic should be stopped instantly. Oxygen should be administered at once, and if possible, brandy, and persisted in until all signs of danger disappear.

Cyanosis suddenly appearing in the course of acute and chronic disease is a symptom of dread import. Insufflation of oxygen must be resorted to at once and powerful heart stimulants freely used.

In traumatic injuries of a serious character, cyanosis sometimes suddenly appears; in severe cases the skin of the entire body as well as the face takes on a horrible bluish tinge.

Finally, the sudden appearance of cyanosis during the administration of anesthetics, and in the course of acute and chronic diseases or as the result of serious traumatic injuries, is oftentimes a direct forerunner of the appearance of Azrael, the Angel of Death, to the stricken one.

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## A Handpiece Saliva Guard.

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By E. L. LITTMAN, D.D.S., Bayonne, N. J.

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A GOOD many dentists who make it a practice of really giving prophylaxis treatments no doubt have had the same difficulty as I have regarding the entrance of saliva into the handpiece during the procedure of cleaning teeth. A satisfactory guard can be made which will preclude this annoyance.

Remove from one of the cup-type of

Abbott's mounted brushes the cup-like metal seat which holds the bristles in place, put it on the regular mandrel flush against the head and solder with a small piece of silver solder.

This mandrel in combination with Burlew's polishing disks will give perfect results.



## **An Amalgam Carrier.**

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**By H. L. STAPLES, D.D.S., New Haven, Conn.**

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THIS carrier is easily made in your laboratory with odds and ends which would otherwise be thrown away.

The idea of the carrier is to facilitate the placing of the amalgam in the cavity with the advantage of being able to see what you are doing and also to prevent the dropping of bits of amalgam on the tongue or down the throat of the patient.

Obtain an old mirror which has outlived its usefulness as a mirror and remove the glass and backing so that all that is left is the shaft with thread on one end and bent neck on the other.

Grind off a flat surface on the opposite side from where the mirror was attached to the shank and drill a hole the size of a pin with a bur through the flat surface near the end.

Having done this next obtain a piece of copper matrix sheet metal, cutting it one-half an inch long and a quarter of

an inch wide. On one side of this strip make an ear and drill a hole through it the size of a pin.

This is then taken and bent up on both sides to form a small trough, with a bend in its middle to prevent the amalgam from rolling off the ends. This can be done with the ordinary crown contouring pliers.

The two ends are then cut into a blunt point so that the sulcus cavities are easily reached with the carrier.

After this has been done the two parts are riveted together by means of a common pin and the carrier is ready for use. By putting the amalgam in the groove and placing the carrier against the wall of the cavity the amalgam can be pushed off with the pluggers into the cavity and condensed without removing the instrument from the mouth.

1138 CHAPEL ST.

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## **Repair of an Aluminum Plate with Vulcanite.**

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**By KAY WHITE, D.D.S., Rockaway Beach, N. Y.**

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MANY times a dentist finds it puzzling to repair an aluminum plate when it is broken into two or more pieces on the palatal surface.

A simple procedure is as follows: Bring the broken parts together into perfect relationship and place two or three match-sticks running crosswise to the crack. Attach the match-sticks to the plate by means of sticky-wax. Then se-

cure a plaster model. Still keeping the plate on the cast take a flat, sharp-pointed instrument which can always be made from an old operative chisel found in the office, and make rows of undercuts on the entire surface, one row running opposite to the other. Hold the pointed instrument against the surface of the plate in such a position as to form an acute angle. The advantage of this is

self-evident: first, you avoid piercing through or producing tiny ridges on the under surface of the aluminum; second, you obtain little slanting pockets which give you good support for the rubber attachment. Also make zigzags in the rubber on the lingual surface of the ridge.

Now wax up, that is, cover the entire area of aluminum with a thin layer of wax of uniform thickness. Then proceed as with any ordinary plate. Invest, pack preferably with light rubber and vulcanize the case. After it is finished an entirely new, strong plate is obtained.

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## To Prevent Discoloration in the Use of Nitrate of Silver.

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By BERNARD FISCHLER, D.D.S., Brooklyn, N. Y.

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THE discoloration of the crown portion of devitalized teeth, the roots of which are to be filled by the Howe silver deposit method, can be prevented by the following procedure:

The first thing to bear in mind is that the nitrate or silver solution must not be applied to the tooth until the cavity and pulp chamber have been thoroughly cleaned out, the nerve removed and a cavity lining applied.

A small piece of the paraffin is inserted into the pulp chamber, a small ball bur-nisher is heated and the paraffin is melted and applied with it to every part of the cavity. This will prevent the silver solution from penetrating into the

crown. If the opening to the root-canal should happen to be blocked by the paraffin, it can easily be opened again with a smooth broach.

Solutions A and B are now applied according to Dr. Howe's method and an antiseptic dressing sealed in until the following sitting when a gutta-percha point dipped in eucalyptol is packed into the root-canal. This can now be done without danger of forcing the solutions through the apex and setting up a pericementitis, as the silver root-filling has now thoroughly hardened. The cavity lining of paraffin is now removed by scraping and drilling and the filling of the tooth completed.

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## REVIEW OF CURRENT DENTAL LITERATURE

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[*British Dental Journal*, London, September 1, 1919.]

### **Treatment of Acute Septic Gingivitis (Vincent's Disease).** BY ALBERT B. COCKER.

After the usual routine treatment of anti-septic mouthwash, iodine, scaling, and removal of septic roots, the gums are syringed two or three times daily with potassium permanganate solution (1 to 5000). A 4-oz. glass or an ear syringe with a fine nozzle may be used. The essential part of the syringing is to use a good deal of force, have the syringe about one foot away from the patient's mouth, and freely syringe all affected parts. This washes away the pus, sloughs, and grayish membrane from the gums and between the teeth. The syringing may be done by anyone at the patient's home.

The effects of the treatment are marked in two or three days. The pain ceases, the fetor of breath disappears, and the gums begin to look healthy. The reasons for this rapid improvement are:

1. The causative organisms are easily washed out if enough force is used in syringing.
2. The organisms that are left are killed by the oxygen of the potassium permanganate, and also cannot flourish in the absence of necrosed tissue which has largely been washed away.
3. The force of the syringing acts as a gum stimulant and the blood supply is increased.

[*American Journal of Medical Sciences*, Philadelphia, November, clviii, pp. 698-702.]

### **Bacteriology of Mumps: Report of Findings at Camp Lee.** BY RUSSEL L. HADEN.

Five cases of mumps are reported in which a Gram-positive diplococcus was isolated from the spinal fluid, the blood, and a lymph gland.

The micro-organism grows on dextrose and plain infusion agar; on blood-agar plates very small, dewdrop colonies appear. No color change occurred in the blood-agar. The injection of the organism into the testicles of a rabbit produced a severe orchitis in ten days.

These findings are contrary to the view that mumps is due to a filterable virus.

[*Tijdschrift voor Tandheelkunde*, March 15, 1919.]

### **A Case of Tuberculosis of the Mandible.** BY W. J. WEMMERSLAGER VAN SPARWONDE.

The left mandible of a man was affected. A fistulous opening existed, discharging pus into the oral cavity. The hard swelling was chiefly localized at the lower border of the mandible with noticeable enlargement of the underlying lymphatics. There was also a discharge to the outside in the neck region. The presence of the cold abscess, the appearance of the soft granulation tissue at the orifices of the cervical fistulæ, and the presence of pulmonary tuberculosis, determined the diagnosis of the process as tubercular in nature, and the oral condition eliminated any other possibility than that of a hematogenous infection.

[*Le Progrès Medical*, Paris, July 26, 1919.]

### **Tuberculosis of the Mandible.** BY A. AINES AND AUBANEL.

The case described was that of a Spanish boy of eight years in good health. A painful tumefaction in the region of the left mandible had been preceded by a number of osseous lesions in other parts of the body (foot), extending through five years. The mandibular tumefaction became fluctuant and an abscess developed so rapidly that in a month and a half it had reached the size of a large orange. The skin was very tense, glistening, but of normal color. The abscess was par-



ticularly painful. It was attached at the mandibular angle by a broad base, easily explored by intrabuccal digitation. In spite of repeated punctures every five or six days, the abscess re-formed very rapidly. Roentgenography showed a notable thinning of the entire left mandible, with a zone of osseous rarefaction. The thinning was especially marked on the body in the region of the angle.

In the diagnosis, differentiation must be made from lesions due to dental disease, *e.g.*, osteomyelitis, from osteosarcoma, actinomycosis, and syphilitic manifestations.

Prognosis is very grave. In a series of 24 cases, 10 only recovered; 6 died of a tubercular meningitis.

Puncture and curettage, with local applications of antiseptics, as iodoform in ether, camphorated naphthol, or zinc chlorid, are indicated in the treatment, together with the very important attention to the general condition of the patient; *e.g.*, heliotherapy, a diet for remineralization, sodium cacodylate, and substantial food.

(*Cf. case in Ned. Tijds. v. Tandhkk.*, 1919.)

[*New Zealand Dental Journal*, Auckland, July 1919.]

### **The True Value of the First Permanent Molar in Children.** BY H. C. GLEESON.

It has become almost a habit of mind with most dental practitioners that the permanent first molar must, at all costs, be saved, and its removal only resorted to when its retention in the jaws is no longer possible. The results of Gleeson's own experience, extending over a period of nine years of dental *hospital* practice, where about 98 per cent. of the patients for conservative work are children, and the examination of about 5000 children attending the primary schools of Auckland, lead the author to the view that the permanent first molar is very often conserved when a greater service to the patient would have been done had *all* the four first molars been extracted.

The age of the patient is always an important factor when considering the line of action to be taken, and the principle should always be laid down that wherever possible the first molars should be retained until the premolars have erupted sufficiently to take the bite. Between the ages of, say, from nine to eleven years, when the mouth is

crowded or shows signs of becoming so, and there is no hope of orthodontic treatment (about 80 per cent. of patients can never hope to have this done), and the first molars are so decayed as to involve the pulp, Gleeson does not hesitate to extract all four permanent first molars, *always provided the premolars are through* as above mentioned. As a result of this treatment, the irregularity is at once considerably improved and goes on improving. The second molars move forward and erupt just behind the second premolars, occupying the place originally of the first molars with this difference, that the pressure having been taken off the other teeth they have spread sufficiently to correct the irregularity for all practical purposes, and the toothbrush can reach all surfaces, which is an impossibility when the teeth are too crowded. The third molar will also have ample room to develop and erupt.

Gleeson is very emphatic, where the teeth have sufficient room in the arch, in advocating conservative treatment of the first molars, but where the teeth are crowded, or show signs of becoming so, he considers the whole mouth as an entity, a unit, and, if judgment favors extraction, he does not hesitate to resort thereto, always provided the premolars are erupted sufficiently to take the bite.

[*Paris Médicale*, September 6, 1919.]

### **Capdepont's Malformation of the Teeth.**

BY P. FARGIN-FAYELLE.

The condition is a generalized dystrophy of the dental tissues, tending to run in families and affecting successively and similarly both dentitions. The lesions are less prominent in the deciduous set.

In the dental system there are anomalies of every type, indicating a profound developmental disturbance. There are anomalies of number, size, implantation, and direction. The very multiplicity of these morphological variations lessens their pathognomic value. The characteristic clinical sign is the marked friability or softness of the extra-alveolar part of the teeth, such as is found in no other dental disease. The affected teeth are only slightly or not at all sensitive to heat or acids. All the teeth are not equally affected. Retarded eruption of the teeth is the rule.

Histologically the enamel shows a little less regular arrangement of the prisms, which

appear slightly hypertrophied. The inter-prismatic substance seems a little more abundant than in normal enamel. The changes in enamel structure and organization (microscopically discernible) are extremely slight compared with the marked changes clinically observable.

The dentinal lesions on the other hand are very accentuated. At low magnification three essential characteristics are recognized:

(1) Progressive diminution of the pulp cavity.

(2) The dentinal tubuli are less numerous, more sinuous, and in certain sections they appear arranged in clusters.

(3) The presence of important spaces formed of (bounded by) globular dentin. The topography of these spaces is most interesting, indicating intermittent disturbances in dentinogenesis. Under higher magnification, it is seen that not only the causative factors were intermittent in action, but at least one or some of the factors were constantly effective. The dentin is globular in structure, suggesting a dystrophy of this tissue *in toto*.

The cementum exhibits a rarefying cementitis. Secondary deposition of cementum at times occurs.

The etiology of this peculiar malformation is unknown. It may be due either to an intoxication developing in the first few weeks of embryonic life, or to some hereditary defect.

[*Carnegie Institute of Washington*,  
Publication No. 261.]

**Food Ingestion and Energy Transformations with Special Reference to the Stimulating Effects of Nutrients.** By FRANCIS G. BENEDICT AND THORNE M. CARPENTER.

Prolonged mastication (*e.g.*, Fletcherism) has received more or less emphatic advocacy from the dental profession, not so much from any presumed general nutritional benefit, but with the idea of affording a much-needed physiological stimulus for the normal development of the teeth, the periodontal structures, the alveoli, the masticatory muscles, the maxillæ, the mandible and the occlusion. The chewing of gum has also been advised to cleanse mechanically the teeth, as a prophylactic against dental caries.

In the light of the above paragraph, a part of the investigations of Benedict and Car-

penter becomes of direct dental interest. In their monograph, some consideration is given to the probable energy transformations resulting from mastication. To study the metabolism during chewing, a series of experiments was made in which the subject chewed gum for a considerable length of time. This study was supplemented by a second series of experiments in which a rubber stopper was substituted for the chewing gum.

The calorimeter experiments included three experiments with the respiration calorimeter, four with the chair calorimeter, and one with the bed calorimeter. In all of these the subject chewed gum. In addition, five respiration experiments were made with the subject chewing gum and two respiration experiments in which a rubber stopper was chewed vigorously.

The total time of chewing in the several respiration experiments varied from 53 minutes to 2 hrs. 19 min.; the total duration of the measurement of the metabolism was from 30 to 60 minutes.

The summary of the results of the respiration experiments (5) shows in all cases measurable increases in the metabolism, these varying from 11 to 27 per cent. Supplementary evidence in regard to the work of mastication was obtained in two experiments in which the subjects vigorously chewed a rubber stopper. Both experiments were made with the respiration apparatus. The increase in metabolism was essentially the same as that found with the other subjects in the gum-chewing experiments, namely, 18 and 14 per cent.; thus verifying completely the more carefully planned experiments on chewing gum. It would appear from the data obtained in this study that the work of mastication, such as would be involved in chewing gum or a rubber stopper continuously, may temporarily require an increment in the metabolism of approximately 17 per cent.

Attention is called to the relation of the measured increase in the metabolism to the question of prolonged mastication. One of the arguments which has been advanced is that such mastication insures the absorption of a larger proportion of material from the ingested food. The fallacy of this reasoning is clearly shown when it is seen that digestion experiments have established the fact that with ordinary mastication from 90 to 95



per cent. of the total energy of foodstuffs is completely absorbed. (These estimates were low.) The possibility of increasing the digestibility or availability of foodstuffs by extreme mastication seems very small. Furthermore, when it is realized that this prolonged mastication demands an excess heat production of approximately 17 per cent. above the basal value, it is easily seen that any advantage gained from a possible increase in the digestibility of the food is more than compensated by the increase in the heat production. The conception of an increase in the digestibility and in the utilization of the energy of foodstuffs as a result of prolonged mastication thus finds no support in fact.

Furthermore, exclusively from the dental viewpoint, the reputed advantages of prolonged mastication (as a physiological stimulant toward normal development and as a prophylactic against dental caries) can at best only be gained by a hitherto unsuspected expenditure of energy. The realization of these advantages is by no means certain; and even if they were realizable, the question would be very pertinent: Do they counterbalance their high metabolic cost, a cost equal to about one-fifth of the total basal metabolism of the body?

[*British Medical Journal*, November 15, 1919, p. 630.]

### **Herpes Zoster of the Glosso-pharyngeal Nerve.** BY C. T. NEVE.

Because of the rarity of buccal herpes, the following case is of interest:

The patient was a woman of fifty-seven years. The symptoms, ascribed to a long, cold motor drive, were, in brief: (1) Fever and vomiting, (2) facial palsy of peripheral type, (3) an auditory nerve affection, (4) on the mucosa supplied by the glosso-pharyngeal nerve, an eruption resembling herpes zoster, and (5) pain felt behind ear and down left side of neck posteriorly.

The fourth of the above items is given in some further detail. The tongue was furred, especially on the left side, where it presented a patchy appearance; the soft palate and fauces were reddened, the former presenting a herpetiform eruption, the vesicles being covered with sodden epithelium. One of these vesicles was just to the right of the midline. Taste was normal.

[*Centralblatt für Bakteriologie, Parasitenkunde, und Infektionskrankheiten. Originale*, 1915. Bd. 76, Abt. 1, SS. 124-34.]

### **Experimental Studies on Hematogenous Infection of the Dental Pulp.** BY ARTURO BERETTA.

The recognition of the possibility of an hematogenous infection of the dental pulp and periapical tissues is at least as old as Miller's paper, "Introduction to the Study of the Bacterio-pathology of the Dental Pulp." (*DENTAL COSMOS*, July 1894, xxxvi, 505-528, or *Centralblatt für Bakt. u. s. w.* Bd. 16, 1894, s. 447.) Beretta's present contribution is a careful and extremely well-organized attempt to adduce experimental evidence for this concept.

If the organisms used by Beretta had been isolated from oral (pulpal) lesions, then his findings could have been called in to support the theory of selective tissue affinity of micro-organisms, particularly the streptococci. But the organisms were not isolated from such sources; and the experiments prove that certain bacteria (and why not streptococci also) may persist in the pulp after their disappearance from the blood stream and most of the other organs of the body. This persistence is due not to the micro-organisms but to a specific or selective action on the part of the cells of the organ affected (dental pulp). In contrast to Rosenow's views, the bacteria may be purely passive agents. Beretta's findings support the alternative interpretation of Rosenow's findings, suggested by Hiss and Zinsser (*DENTAL COSMOS*, Jan. 1919, p. 74), namely, that in the "selectivity" a hypersusceptibility of individual tissues of the host plays the predominant rôle. The organisms used were *M. aureus*, *Pseudomonas pyocyanea*, *B. prodigiosus*, and *B. clavatus*. Biffi.

Almost avirulent cultures were inoculated, because the problem was primarily one of the localization of bacteria during a transient bacteriemia, rather than during a true septicemia. In this latter condition the micro-organisms are constantly present in the circulation and therefore obviously also present in the blood of the pulp.

To determine the exact behavior of the different bacteria in regard to the dental pulp, there was adopted as a criterion a com-



parison with what was occurring in other organs and tissues; the relative bacterial content between pulp and blood, and between pulp and certain lymphoid organs (spleen and bone-marrow). In these latter organs, it is well known that bacteria usually persist some time after their disappearance from the general circulation.

Guinea-pigs were inoculated intravenously or intraperitoneally. At various time intervals they were killed with carbon dioxide. They were opened aseptically and with a Pasteur pipet blood was taken from the right heart and small pieces of spleen and bone-marrow. These were planted on ordinary media. The maxillæ and mandible with the teeth *in situ* were completely removed. The pulp was reached not through the coronal portion of the tooth, but laterally through the alveolus. Pulpal material was inoculated onto ordinary media. In this way from the number of the colonies, it was possible to get a comparatively exact idea of the number of bacteria present in the pulp. It was found that the tooth pulp of normal guinea-pigs, used as controls, at times contained bacteria.

It was found that *M. aureus*, injected intravenously, remained in the dental pulp of guinea-pigs after its disappearance from the circulation. The organisms were found in the pulp in even larger numbers than in the spleen or bone-marrow. *B. prodigiosus* and *Ps. pyocyanea*, were not found in the dental pulp after their disappearance from the general circulation. *B. clavatus*, Biffi (a spore-former) was recovered from the pulp after its disappearance from the circulation. Even in the lymphoid organs it was absent or extraordinarily rare.

Experiments on dogs. To project upon the plane of human pathology, the results of work upon the teeth of guinea-pigs, is not entirely permissible without further evidence. The guinea-pig tooth is a rootless or permanently growing tooth with a wide-open apical "foramen" persisting throughout life. For this reason, Beretta continued this work upon dogs, whose teeth are more comparable to those of man. The pulpal cultures were taken from the canines. The organisms used (because they yielded the most promising results in the guinea-pig experiments) were *M. aureus* and *B. clavatus*, Biffi. The cultures were injected into the vena saphena externa or into

the marginal vein of the ear. After varying periods of time, the animals were killed by forcing air into the venous system (air-emboli).

Aseptically, the canines were extracted, washed in alcohol, flamed and opened with a flamed chisel. In contrast to the findings in the guinea-pig, organisms other than those injected were never encountered in the pulps of dogs. *M. aureus* was found in the dental pulps of dogs some time after its disappearance from the blood. Likewise it persists in the spleen and bone-marrow. *B. clavatus* was demonstrated in the dental pulp after its disappearance from the blood.

When micro-organisms are present in the general circulation, they not only pass through the dental pulp along with the blood, but they can also be detained therein, apparently in consequence of the phagocytic action of the fixed cells of the pulp or of the wandering cells which may be present in this organ. It is obvious that, while normally such organisms will be sooner or later destroyed, yet in pathological conditions as a result of external influences (*e.g.*, trauma) by which the vitality of the pulp is diminished, they may survive in this *locus minoris resistentiæ* and overcome the defenses of the body.

[*Journal of Pathology and Bacteriology*,  
Cambridge, Eng., May 1919.]

#### **A Dentigerous Cyst on the Upper Jaw of a Cod.** BY H. CHARLES WILLIAMSON.

This is a bare descriptive note of a condition apparently not heretofore described. The tumor was a hard spherical knob projecting from the right premaxilla 3 x 3 cms., consisting of a bony capsule covered with a thick, fairly soft, rugose skin. Seventeen hundred teeth were present inside the cysts; while about fifty were noticed in the subdermal layer. The teeth of the tumor (each 2.2 mm. in length) resemble those on the premaxilla, but none reaches the size of the largest of the normally located teeth. The cyst apparently arose through the persistence on the anterior side of the premaxilla, between the periosteum and the bone, of a portion of dentigerous tissue. Its activity in producing teeth had induced the growth of the bony capsule. The tissue had issued from the cyst and grown between the derma and the outside of the capsule.

# PERISCOPE

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**A Mild Caustic.**—We not infrequently find gum tissue around the margins of a root grown up into ragged prominences. These may be gotten rid of by applying a little burnt alum.—*Brit. Journ. of Dental Science.*

**Copper Amalgam Ladle.**—A scratched or broken mouth-mirror can be made into a very useful instrument. Break out the glass disk and you have a nice ladle for heating copper amalgam over the Bunsen burner.—H. A. PASKOW, Elizabeth, N. J.

**Xylol as a Solvent.**—Should anyone have the misfortune, as I had, to spill sandarac varnish on woolen clothes, I would advise him to use xylol to remove it. After trying many so-called solvents I found that the only one which effectually removed the gum was xylol.—G. C. NICHOLSON, *Commonwealth Dental Review.*

**Synthetic Fillings.**—Where one is to make a synthetic or oxyphosphate filling, and where it is impossible to use the rubber dam, paint the surrounding gum with dilute trichloroacetic acid; this will stop the exudation of moisture from the gum and work can then be carried out in a dry area without fear of having the filling spoiled by moisture.—J. LEVIN, *Commonwealth Dental Review.*

**Synthetic Fillings.**—There are times when one has a small synthetic filling to make, and finds great difficulty in getting a tantalum instrument small enough to carry the material to the cavity and compress it. I use, in such cases, a new orange-wood stick, with a long, finely-tapered point at one end, and flattened at the other. Coca butter, in conjunction, is useful.—J. LEVIN, *Commonwealth Dental Review.*

**Lead Packing for Vulcanizer.**—My vulcanizer recently became leaky; being rather busy and not wishing to soil my hands by removing the old packing, I cut a washer from sheet lead, placed it in the groove, and clamped the lid on the vulcanizer. It has been in use for three months, and there is no sign of steam escape. As the lead—unlike the regulation packing—always remains soft,

it adapts itself to any irregularities, and should remain permanently satisfactory; it is easily replaced in a few minutes. I do not claim originality for the above, as I have a dim recollection of seeing the idea described somewhere, several years ago.—C. C. BERTRAM, *Commonwealth Dental Review.*

**Two Contra-indications to Local Anesthesia.**—First, in those cases where false ankylosis has developed. In a large percentage of these conditions we find a lower third molar responsible. The patient is suffering pain, and we are unable to open the mouth sufficiently to expose the field of injection. The mental state of these patients is usually in itself so abnormal that local anesthesia would afford little relief. For these cases a narcotic is imperative.

Second, injections must not be made into a septic field. In inflamed areas we cannot logically expect a local injection to do its best work, and the ever-present danger of extending the already established infection to deeper healthy strata must be avoided.—F. W. ROUNDS, *Dental Summary.*

**Construction of Cast Clasps.**—In the construction of the cast clasp the natural anatomical occlusal constriction of the tooth is taken advantage of in order to afford a firm seat for the clasp. A reciprocal bearing of the clasp on the tooth is also absolutely essential, otherwise the clasp will act as a regulating appliance, loosen the tooth, and move it in the direction of the pressure exerted. The clasp must encircle the tooth so that it will be held firmly, and the force of mastication be properly distributed on the tooth as it was before the clasp was used. In using the cast clasp and saddle, the two should be so made and assembled as to give a proper co-ordination between them, with the result that both the saddle and the clasp will receive a certain amount of the force of mastication. If too much stress is borne by the tooth from the use of the cast clasp, it will result in the tooth being prematurely lost, and if the saddle receives too much force of the mastication it will result in an improper restoration of function or masticating efficiency.—F. E. ROACH, *Journ. N. D. A.*



**Dental Conditions in Pregnancy.**—According to Dr. J. W. Ballantyne (*British Medical Journal*) 98 per cent. of the women attending an ante-natal clinic suffered from dental disease. Dr. Rose L. Molloy writing in the same paper mentions that her experience coincides with that of Dr. Ballantyne. Treatment, so far from being undesirable in pregnancy, has proved most efficacious and valuable, the general health improving as the dental troubles were removed. Some hundreds of expectant and potential mothers attending clinics have been treated, Dr. Molloy states, for extractions, fillings, and dentures, and although the treatment in many cases has been undertaken as late as the seventh month, in no case has there been the slightest untoward result.—*Brit. Journ. of Dental Science.*

**Mixing Alloys.**—All high-grade alloys amalgamate rather slowly. It requires thorough rubbing of the particles in the presence of mercury to develop thorough amalgamation, conditions that prohibit a hand mix. Mixing is best accomplished by rapid rubbing in a deep mortar for a minimum time of three minutes. A measure of time is the only dependable guide to a thorough mix.

Thorough mixing is necessary to attain that plasticity most favorable to adaptation. It is also necessary to the greatest strength of the filling, and it is the means by which we may practically eliminate that movement immediately following the placing of the filling. This early movement is common to all alloys.

Mercury may be added or expressed during the mixing to meet the requirements stated.—W. M. E. HARPER, *Journ. N. D. A.*

**Apical Pathological Areas.**—Pathological areas at the apices of teeth have, as their origin, infection following the death of the dental pulp. The death of the pulp can be from caries, traumatism, irritation, or devitalization by the dentist. The causative bacteria either pass up the root-canals and enter the apical area, or are deposited by the blood stream, from other parts of the body, on the periapical tissue of pulpless teeth. The presence of bacteria in the blood of normal people, however, is a point of much argument with bacteriologists. In the recent influenza epidemic in Egypt, however, where there was a death record of 1000 troops, it was the rule to find the streptococcus in the blood stream of all severe cases. The use of strong and irritating drugs forced through the apical foramen will lower the resistance of the surrounding tissue and favor apical infection, as will the injury set up by passing a broach

too far through the apical foramen; but the greatest factor is supposed to be the failure of the dentist to observe the absolute asepsis and the complete sterilization of root-canal operations.—H. C. MOXHAM, *Commonwealth Dental Review.*

**Metric System Explained in One Minute.**—A member of the World Trade Club holds the world record for rapid explanation of the metric weight measurements and the way in which they ought to be used. He does this in one minute. An objector who had never looked the matter up declared that the metric system was complex, and that it would take a long time to learn it. It was then that the member of the World Trade Club first undertook to explain, in one minute, all that is needed to be known of metric units. He did it to the satisfaction of eminent auditors. Here is how he did it:

"Learn only the units, dollar, meter, liter, gram; dollar, the measure of value; meter, the measure of length; liter, measure of bulk; gram, for weight. You know all about the American dollar. The metric units, meter, liter, gram, are just like the dollar, divided decimally and multiplied decimally. If you want to compare metric units with present units, the meter is 10 per cent. more than the yard; 500 grams is about 10 per cent. more than the pound avoirdupois; the liter is 5 per cent. less than the United States liquid quart (13 per cent. less than the British liquid quart). That is all ninety per cent. need to use the metric standards."

**A Quickly Made Richmond Crown.**—Prepare the root with the post hole free from undercuts. Grind the facing to fit the root; also grind a biting edge as necessary. Make the post (loose fitting) to project from the root as far as possible without interfering with the pins of the facing or opposing teeth. Roughen the post to give a grip to molten gold. Take care of inlay wax, soften, and press hard on the root. Heat the post, and plunge through wax into the canal. Build up the wax backing and soften with hot-air blast. Take the facing (previously oiled), press into soft wax, and give the correct set on the root. By using thumb and forefinger the facing can be easily adjusted without spoiling the adaptation to the root. Shape up wax to tooth form and carefully remove complete from the root. With care the facing can be removed and the pinholes in the wax filled with carbon points. Invest and cast. Clean up and cement the facing. The pin-



holes on the lingual side of the backing can be countersunk and the pins burred over. If preferred, the pins of the facing can be bent before embedding in wax, and the gold be cast direct to the facing. Care must be taken not to allow any wax to get on the sides of the facing, as the contraction of gold will cause checking. Where expense is a consideration, I have obtained satisfactory results with acolite.—C. C. BERTRAM, *Commonwealth Dental Review*.

**Cementing on a Bridge.**—After the utmost care and painstaking in constructing a bridge, one may fail at the last moment in what seems a simple matter—that of cementing it properly on the piers. We all know the difficulty of handling cement in hot weather; unless mixed on a cooled slab it sets too rapidly. This deserves a special word in passing.

We have been reminded that cements properly mixed, that is to say, by drawing the powder slowly and in small portions at a time into the liquid, set more slowly. What we now refer to more particularly is the setting of the cement, no matter how thin the mix, before we have fairly pressed the bridge down to place. It often happens that hurry as we may, we find it has not gone exactly far enough down, so that considerable grind-

ing is required to get a proper occlusion. The patient returns again and again, complaining that it keeps the teeth from closing, and we spend an hour or two in grinding. This is not an uncommon experience. The annoyed dentist resolves that it shall not occur the next bridge he makes. Yet despite all care it does happen again.

What is the precaution required to prevent this? Why does it happen?

Dr. Richmond, the inventor of the shell crown, instructed dentists to drill a small hole in the crown, at a point convenient for filling with foil, after setting the same. This allows the cement to escape, and permits us to force it quite to place. This precaution seems to be wholly neglected today. I believe it always should be observed, especially in cases where the tooth or teeth crowned be trimmed only to a cylindrical shape. Even in cases where the crown has been trimmed to a point, it acts as a piston within the encircling shell of gold, compressing the cement, and causing it to act as a buffer, preventing the crown from going to place. This may happen even though the cement be mixed quite thin, almost of a creamy consistence.

Since returning to Dr. Richmond's early instructions, I have had little difficulty in setting bridges, and been spared much after-grinding.—FRANK W. SAGE, *Dental Summary*.

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## OBITUARY

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### Dr. William W. Belcher.

[SEE FRONTISPIECE.]

DIED, at his home, 186 Alexander st., Rochester, N. Y., Thursday, December 4, 1919, of edema of the brain, WILLIAM WELLINGTON BELCHER, D.D.S.

Dr. Belcher was born at New Milford, Pa., August 27, 1866, the son of John W. and Lois Belcher. Dr. Belcher obtained his early education in the grammar school of Ithaca, N. Y. He early in life became interested in dentistry and in 1881 entered the office of Dr. Henry Tripp of Albany, N. Y., where he studied for two years in preparation for entering a dental school. He later entered the Philadelphia Dental College, from which in-

stitution he received the D.D.S. degree in 1889. Immediately after his graduation he began the practice of dentistry in Seneca Falls, N. Y., and later in Auburn, N. Y. In 1896 he removed to Rochester, N. Y., and associated himself in practice with Dr. J. Edward Line, and later with Dr. Henry Miller. After these affiliations he began practice for himself and for many years conducted a successful practice.

Dr. Belcher was one of the founders of the Rochester Dental Dispensary, the first institution of its kind established in the United States. He was actively interested in the dispensary work and as the result of his enthusiasm he became the editor of the *Dental Dispensary Record*, which was devoted to stimulating public interest in the establish-

ment of dental dispensaries over the country. So successful were he and his associates of the Rochester Dental Society in the propaganda for public dental dispensaries that it may be said that the Rochester Dental Dispensary, so magnificently endowed by Mr. George Eastman, is a direct result of their efforts.

Dr. Belcher became editor of *Oral Hygiene* in September 1914, and up to the time of his death vigorously preached the gospel of Oral Hygiene personally and through the columns of the magazine.

Dr. Belcher was widely known in the dental profession and possessed many lovable traits of character which endeared him to all who had the privilege of his friendship and acquaintance. He was a member of the Seventh District Dental Society of New York, which he had served as president; a member and at one time chairman of the Board of Directors of the Rochester Dental Society, a member of the Dental Society of the State of New York, and the National Dental Association.

Dr. Belcher was married in 1890 and is survived by his widow; his father, John W. Belcher; his brother, Harry L. Belcher, D.D.S.; two sisters and one son, Harold W. Belcher.

His remains were interred in the Fort Hill Cemetery, Auburn, N. Y., Saturday, December 6, 1919.

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### "In Memoriam" Resolutions.

#### Dr. W. W. Belcher.

THE following resolutions were adopted by the Rochester Dental Society on the death of Dr. W. W. BELCHER.

Whereas, Dr. William Belcher passed from this life on Thursday, December 4, 1919, at his home, 186 Alexander st., Rochester, N. Y.

Dr. Belcher was born at Milford, Pa., August 27, 1866. After receiving his early education he entered the Philadelphia Dental College and was graduated in 1889. On the completion of his postgraduate work he located in Seneca Falls, N. Y., remaining there six years. Dr. Belcher moved to Auburn, N. Y., and was associated with Dr. Henry Tripp. In 1896 he moved to Rochester and associated himself with Dr. J. Edward Line and later with Dr. Henry Miller. After these affiliations he began practice by himself and made a conspicuous success.

Dr. Belcher's great love and enthusiasm to provide proper dental attention for poor children appealed to him more than the material rewards of professional attainment. To this cause he devoted his untiring efforts and with other colleagues he was instrumental in establishing the first free Dental Dispensary, one of the two institutions of its kind in the world.

Dr. Belcher was widely known as an editor of dental magazines and the *Dental Dispensary Record*, conceived and edited by Dr. Belcher himself, proved to be a most potent factor in stimulating public interest in the subject of philanthropic dentistry. As a lecturer his ability found a most easy and natural expression.

Dr. Belcher possessed many lovable traits, a fund of humor and good fellowship, which made him a favorite companion of all who knew him.

RESOLVED, That we, the members of the Rochester Dental Society, do record our deep sense of the loss which the dental profession and this society have sustained; and be it further

RESOLVED, That we extend to the family our sincere and heartfelt sympathy, and that these resolutions be spread on the minutes and be published in the dental journals, and that copies be sent to the family of our departed member.

JOHN H. PARMELEE,  
CHARLES J. PIERCE,  
HOWARD F. LEWIS, *Chairman*.

# DENTAL COLLEGE COMMENCEMENTS

## St. Louis University, School of Dentistry.

THE commencement exercises of the St. Louis University, School of Dentistry, were held in St. Louis, Mo., on Thursday, October 2, 1919, in the university auditorium.

The commencement address was delivered by Don R. Joseph, M.S., M.D.

The degree of Doctor of Dental Surgery was conferred by the president, Rev. Bernard J. Otting, S. J., on the following graduates:

Walter Benton .....	Missouri	Raymond A. Kyle .....	Illinois
Harry Bloch .....	New York	Alfonso Leon .....	South America
Olen J. Bott .....	Illinois	Harold H. Loeffler .....	Missouri
William L. Bunge .....	Missouri	Glenn J. McAllister .....	Iowa
Edgar M. Carpenter .....	Illinois	William A. McCracken .....	Illinois
John J. Collins .....	Missouri	Paul F. McCutcheon .....	Missouri
Leo D. Cougot .....	Missouri	Henry S. Monell .....	Missouri
Frederick I. Coutant .....	Missouri	Frank A. Ochs .....	Illinois
William M. Davis .....	Missouri	Arthur O. Ozment .....	Illinois
Howard M. Dummit .....	Missouri	John C. Proctor .....	Illinois
George W. Duncan .....	Missouri	Kelsie O. Pylant .....	Arkansas
Alva J. Dunlavy .....	Nebraska	Albert E. Rigor .....	Illinois
Edward H. Eden .....	Missouri	Martin T. Rippe .....	Missouri
Ross D. Farley .....	Oklahoma	John B. Ruyle .....	Illinois
Frank G. Finck .....	Missouri	Earl V. Ryan .....	Illinois
Bernard Goorman .....	Missouri	Edward Schaeckel .....	Nebraska
Earl R. Greenman .....	Iowa	John A. Schwaig .....	Missouri
Willis C. Gross .....	Missouri	Albert Shinneman .....	Missouri
Tom S. Hensley .....	Illinois	Joseph A. Shoemake .....	Missouri
Leo A. Hindenach .....	Kansas	Earle B. Sims .....	Illinois
Franklin O. Holland .....	Kansas	Justin C. Smith .....	Missouri
Edward Hughes .....	Illinois	Jacques D. Summerlin .....	Florida
George D. Jacobs .....	Oklahoma	Luther O. Wiececarver .....	Missouri
Walter P. Joenk .....	Missouri	William E. Wilson .....	Illinois
Henry J. Kamp .....	Missouri	George W. Woolard .....	Illinois
Benjamin Koplo .....	Missouri		

## ARMY AND NAVY DENTAL NEWS

### Promotions.

#### Navy Dental Corps.

The following nominations (promotions) are announced:

To be FIRST LIEUTS: P. P. A. Chesser, R. E. Morgan, J. A. Murray, C. W. Russell, J. H. Jones, F. V. Bockey, J. L. Olsen, G. D. Lacey, H. S. Whitney, A. MacK. Telfer, E. W. van D. Cowan, C. W. Scogin, B. M. Epes, and W. C. Caldwell.

#### Army Dental Corps.

To be CAPTAIN (in the regular army): W. H. Watts.

### Assignments.

#### Army Dental Corps.

*Week ending December 20th.*

Capt. Warren C. Caldwell, report by wire to commanding general, Southern Department, for duty.

Capt. Alexander M. Smith, Jr., to Fort Bliss, Tex., base hospital for duty.

*Week ending December 27th.*

Maj. Benjamin C. Warfield, report by wire to commanding general, Northeastern Department, for assignment.



1st Lieut. Arthur F. Bokman, to Columbus Barracks, Ohio, for duty.

*Week ending January 10th.*

Maj. Charles M. Taylor to Walter Reed General Hospital, D. C., for duty.

Maj. William D. White to Alcatraz, Calif., disciplinary barracks, for duty.

Maj. Earle J. McClung report by wire to commanding general, Western Department, for assignment to duty.

Maj. Robert R. Luce, honorably discharged.

Capt. Joseph L. Rahm to Arcadia, Calif., Ross Field, for duty.

Capt. John L. Davis to Camp Upton, N. Y., for duty.

Capt. Leon M. Muedeking to Fort Sheridan, Ill., general hospital 28, for duty.

1st Lieut. Herbert E. Guthrie to San Antonio, Tex., Kelly Field, for duty.

**Navy Dental Corps.**

*Week ending December 10th.*

Lieut. Wm. S. Thompson, detached from Mare Island; to duty at naval station, Guam, January 20, 1920.

Lieut. Rolland W. Quesinberry, detached from naval training station, San Francisco, Calif.; to U. S. S. Wyoming.

Lieut. (Jn.Gr.) Justin W. Bourquin (class 2), detached from marine barracks, navy yard, Philadelphia, Pa.; to navy yard, Charleston, S. C.

*Week ending December 19th.*

Lieut. Albert Knox, detached from U. S. S. Wyoming; to naval training station, San Francisco, Calif.

Lieut. Irving G. Kohlmeier, detached from U. S. S. New York; to naval training station, San Francisco, Calif.

Lieut. Sidney M. Akerstöm, detached from navy yard, Washington, D. C.; to U. S. S. Panther.

Lieut. Charles C. Bockey, detached from U. S. S. Panther; to navy yard, Washington, D. C.

*Week ending January 6th.*

Lieut. Commander George H. Reed, detached from U. S. S. Mercy; to naval training station. Great Lakes, Ill.

## Preparedness League of American Dentists.

ORGANIZED UNDER THE AUSPICES OF THE N. D. A.

### L'Aide Confraternelle aux Dentistes Francais et Belges, Victimes de la Guerre.

*FROM THE TREASURER.*

SUBSCRIPTIONS to date—Fund for the Relief of French and Belgian Dentists:

Amount previously acknowledged .....	\$2,635.00
South Dakota State Dental Society .....	50.00
Georgia State Dental Society .....	130.00
Dr. Hector G. Marlatt .....	5.00
Miss Mary Daly .....	1.00
Warren County Dental Association .....	10.00
<b>Total .....</b>	<b>\$2,831.00</b>

On December 31, 1919, we sent a draft to the Committee in France for \$2000.

Yours truly,

L. M. WAUGH, *Treasurer,*

576 Fifth ave., New York, N. Y.

# SOCIETY NOTES AND ANNOUNCEMENTS

NOTICES should reach the Office of the DENTAL COSMOS **not later** than the 11th or 12th of the month preceding that of publication.

## American School Hygiene Association.

### TWELFTH ANNUAL CONGRESS.

THE twelfth annual congress of the American School Hygiene Association will be held in Cleveland, O., February 24, 25, 26, 27, and 28, 1920.

The preliminary program of the Congress has just been issued by its secretary, Dr. William A. Howe of the State Department of Education, Albany, N. Y.

This association is composed of prominent educators and health workers in various parts of America. The program as outlined will consist of nine one-half day sessions, beginning on Tuesday morning, February 24th, and closing on Saturday morning, February 28th.

All of the first day will be devoted to the consideration of Health Education. The entire second day will be devoted to School Health Service, including School Medical Inspection, Physical Education, School Nursing, and other activities under the general title of School Health Service. The session on Thursday morning will be devoted to Sex Education and Communicable Diseases. State Commissioner of Health Freeman of Ohio is listed as chairman of this section. Thursday afternoon is given to the subject of Nutrition of School Children, under the chairmanship of Dr. William R. P. Emerson of Boston. On Friday morning seven papers on Mouth Hygiene will be presented by prominent dentists of this country and Canada. The full program of this section is given below. Friday afternoon will be devoted to Mental Hygiene, under the chairmanship of Dr. Henry H. Goddard of Columbus, Ohio. The closing session on Saturday morning will be devoted to a symposium on the Relation of Health and School Authorities. Dr. Willard S. Small

of the U. S. Bureau of Education is chairman of this section.

The entire program is filled with much valuable material and will prove, in our opinion, the most constructive and progressive contribution of recent years to our literature of school health service. It is earnestly hoped that the dental profession of the country will avail itself of the opportunity, not only to hear the section devoted to Mouth Hygiene, but many others of the Congress.

Membership in the association, which includes a copy of the proceedings of the Congress, is \$3 a year. Let the secretary hear from you.

The program of the section on Mouth Hygiene, to be held on Friday, February 27th, at 9.30 A.M., is as follows:

### PROGRAM.

Otto U. King, D.D.S., Secretary N. D. A. "How Can the National Dental Association Aid in a Program for Better Teeth and Better Health for School Children?"

Rea P. McGee, M.D., D.D.S., editor *Oral Hygiene*, Pittsburgh. "Teaching of Mouth Hygiene to School Children from the Viewpoint of the Dental Journalist."

Major L. G. Mitchell, U. S. A., Washington, D. C. "The Relation of Good Teeth, Clean Mouths, and Good Nutrition to Good Health" (with film, "Come Clean").

Homer C. Brown, D.D.S., ex-president N. D. A. "Oral Hygiene and Its Relation to All Health Educational Activities."

Dr. Eudore Dubeau, L.D.S., Ecole de Chirurgie Dentaire de Montreal. "How Can School Children be Taught Preventive Dentistry?"

Harvey J. Burkhart, D.D.S., Director Rochester Dental Dispensary. "Children's Work in the Rochester Dental Dispensary and in the Schools of Monroe County."

Walter J. Multer, Roslyn High School, Roslyn, L. I. "Junior Red Cross and School Dental Ambulance Service in Rural Communities in Nassau County."

WM. A. HOWE, *Sec'y*,  
State Education Bldg., Albany, N. Y.

### American Society of Orthodontists.

THE next annual meeting of the American Society of Orthodontists will be held at the Edgewater Beach Hotel, Chicago, Ill., Monday, Tuesday, and Wednesday, April 5, 6, and 7, 1920. Those interested in orthodontia are invited to attend.

J. V. MERSHON, *President*,  
Philadelphia, Pa.  
F. M. CASTO, *Sec'y*,  
Cleveland, Ohio.

### National Dental Association.

THE twenty-fourth annual meeting of the National Dental Association will be held in Mechanics Building, Boston, Mass., August 23 to 27, 1920.

The Mechanics Building is one of the largest in the United States for exhibition purposes of every description. It is over six hundred feet in length and covers over three acres of land, containing over 150,000 square feet of floor space, and is known all over the continent as the home of the far-famed poultry, automobile, and dog shows, mechanics' and food fairs. World-renowned opera singers have entertained thousands of music lovers in the Grand Hall. Presidents and noted speakers have addressed thousands of citizens of Massachusetts in this vast hall.

The association is indeed fortunate to secure such a building for its meeting, as it assures ample room for clinics, demonstrations, and exhibits under one roof, with facilities for taking care of ten thousand members of the profession and guests.

F. E. JEFFREY, *Chmn. Pub. Committee*,  
Salem, Mass.

### Marquette University.

THE annual meeting of the Dental Alumni Association of Marquette University will be held on February 11, 12, and 13, 1920, in the Milwaukee Auditorium, Milwaukee, Wis.

V. A. SMITH, *Sec'y*,  
Milwaukee, Wis.

### Washington University School of Dentistry.

#### ALUMNI ASSOCIATION.

ARE you planning to attend the Home Coming of the Alumni Association of Washington University School of Dentistry, Feb. 23-24? There will be practical demonstrations as well as individual clinics and clinics of the St. Louis Study Club. This meeting promises to be the best and most interesting ever held, so help yourself and the Alumni Association by being present. The meeting will be held at the College Building, 29th and Locust sts., St. Louis.

A. V. SANDERS,  
*Chmn. Publicity Committee*,  
University Club Bldg., St. Louis, Mo.

### Illinois State Dental Society.

#### CHANGE OF DATES.

THE fifty-sixth annual meeting of the Illinois State Dental Society will be held in Chicago, beginning Monday, March 22, 1920, and continuing for four days. Headquarters will be at the Congress Hotel, where sessions, clinics, and exhibits will be housed.

J. P. LUTHRINGER, *Sec'y*,  
Peoria, Ill.

### South Dakota State Dental Society.

THE thirty-eighth annual meeting of the South Dakota State Dental Society will be held in Sioux Falls, S. D., March 29 to April 3, 1920. One week of postgraduate instruction will be given under the following clinicians: Drs. Arthur E. Smith, Chicago, Ill., F. Ewing Roach, Chicago, Ill., Dayton D. Campbell, Kansas City, Mo., and T. W. Maves, Minneapolis, Minn.

ERNEST W. ELMEN, *Sec'y*,  
608 S. F. Nat'l B'k Bldg., Sioux Falls, S. D.

### Texas State Dental Society.

THE Texas State Dental Society will hold its fortieth annual convention March 8 to 13, 1920, at Dallas, Tex.

The special feature of this meeting will be postgraduate class courses conducted on the "Oklahoma plan."

These classes will be conducted by the following well-known men: Dr. Thomas B. Hartzell, Minneapolis, Minn.; Dr. F. Ewing Roach,



Chicago, Ill.; Dr. Arthur E. Smith, Chicago, Ill.; Dr. Dayton D. Campbell, Kansas City, Mo.; Dr. T. W. Maves, Minneapolis, Minn. Other instructors may be employed.

J. G. FIFE, *Sec'y*,  
736 Wilson Bldg., Dallas, Tex.

### Minnesota State Dental Association.

THE thirty-seventh annual convention of the Minnesota State Dental Association will be held at the West Hotel, Minneapolis, Minn., on March 4, 5, and 6, 1920.

MAX E. ERNST, *Sec'y*,  
1125 Lowry Bldg., St. Paul, Minn.

### Vermont State Dental Society.

THE Vermont State Dental Society will hold its next annual meeting in Burlington on Wednesday, Thursday, and Friday, March 17 to 19, 1920.

PHILIP E. MELLEN, *Sec'y*,  
Middlebury, Vt.

### Missouri State Dental Association.

THE next annual meeting of the Missouri State Dental Association will be held in Kansas City, Mo., April 12, 13, and 14, 1920.

H. C. POLLOCK, *Sec'y*,  
St. Louis, Mo.

### Kentucky State Dental Association.

THE next annual meeting of the Kentucky State Dental Association will be held in Louisville, Ky., April 7, 8, and 9, 1920.

A program of unusual interest has been planned. Address all correspondence to

W. M. RANDALL, *Sec'y*,  
Louisville, Ky.

### Philadelphia Dental College.

#### ALUMNI SOCIETY.

THE annual meeting of the Alumni Society of the Philadelphia Dental College will be held on Wednesday, April 21, 1920, at 9 A.M., in the College building at Eighteenth and Buttonwood sts., Philadelphia. All members of the Alumni should note the date and arrange to be present.

F. S. FLUCK, *Pub. Com.*,  
2440 N. Seventh st., Philadelphia, Pa.

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### Pennsylvania State Dental Society.

THE fifty-second annual meeting of the Pennsylvania State Dental Society will be held in the Rajah Theatre, Reading, Pa., April 27, 28, and 29, 1920. An interesting and instructive program has been prepared. All ethical practitioners are invited to be present.

W. L. FICKES, *Sec'y*,  
6004 Penn ave., Pittsburgh, Pa.

### Michigan State Dental Society.

THE next annual meeting of the Michigan State Dental Society will be held at the Hotel Statler, Detroit, Mich., April 12, 13, and 14, 1920.

The chairman on local arrangements is William H. Waller, 613 Washington Arcade, Detroit, Mich., and the secretary, Claude S. Larned, 614 Post Building, Battle Creek, Mich.

CLAUDE S. LARNED, *Sec'y*,  
Battle Creek, Mich.

### Dewey School of Orthodontia.

#### ALUMNI SOCIETY.

THE next annual meeting of this society will be held on April 1, 2, and 3, 1920, at the Edgewater Beach Hotel in Chicago. The usual high standard of the meetings of this society will be maintained. One half-day will be devoted to clinics. All interested in orthodontia are cordially invited to attend these meetings.

GEORGE F. BURKE, *Sec'y*,  
741-43 David Whitney Bldg., Detroit, Mich.

### Dental Society of the State of New York.

THE fifty-second annual meeting of the Dental Society of the State of New York will be held in Albany, May 13, 14, and 15, 1920, at the Hotel Ten Eyck. An interesting program of essays and clinics is being prepared and will be announced later. All ethical dentists residing in New York and adjoining states are cordially invited to attend the meeting.

Dr. L. S. Blatner, 346 State st., Albany, N. Y., is chairman of the Exhibits Committee.

A. P. BURKHART, *Sec'y*,  
52 Genesee st., Auburn, N. Y.

## Oral Hygiene Association of Columbia University.

THE Oral Hygiene Association of Columbia University, organized in October 1917 by the graduates of the first class in Oral Hygiene at Columbia University, held its first meeting of the season on October 7, 1919, in Havemeyer Hall. The new officers, elected at the annual meeting in May, were in charge, and interesting plans for the winter were announced.

On November 12th the regular meeting was held in Students' Hall, Barnard College. Dr. Margaret Donahoe of New York City lectured. On December 9th Dr. Leuman Waugh of New York gave an illustrated lecture on "A Study of the Gingival Border and the Cemento-enamel Junction."

The meetings of the association, which are held regularly on the first Tuesday of each month, unless a change of date is necessary,

are increasingly well attended. The society is anxious to enroll as associate members dentists and licensed dental hygienists who are graduates of other schools than Columbia. Application blanks may be procured from Miss Maud Wilson, 576 Fifth ave., New York City.

MILDRED FARMER STAHL, *President*.

RAE MELNICOFF.

*Chairman Press Committee.*

## Massachusetts Board of Examiners.

THE next meeting of the Massachusetts Board of Dental Examiners will be held in Boston, Mass., March 10, 11, 12, and 13, 1920, beginning promptly at 9 A.M., March 10th.

All applications must be in the hands of the secretary by March 1st. Fee for examination, \$20. Full information and application blanks may be received by addressing

J. N. CARRIERE, *Sec'y*.

352 Main st., Fitchburg, Mass.

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# UNITED STATES PATENTS

## PERTAINING OR APPLICABLE TO DENTISTRY

ISSUED DURING DECEMBER 1919.

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### *December 2.*

No. 1,323,420, to ARTHUR SUTTER. Electric lamp for dental and other uses.

No. 1,323,697, to JESSE C. KING. Means for measuring teeth.

No. 1,323,743, to HENRY CALLSEN. Dental bridge.

No. 1,323,833, to ISIDOR CHIGE. Dental-bridge tray.

### *December 9.*

No. 1,324,173, to RICHARD ROSS. Combined toothbrush and powder holder.

No. 1,324,319, to JAMES M. O'KEEFE. Dental articulator.

No. 1,324,326, to WILLIAM G. TONKINSON and ALBERT G. HAUSAM. Dental inlay casting machine.

No. 1,324,331, to R. G. DE LA BELDAD. Dental bridge work.

No. 1,324,429, to MANNON, BROWN, and PERKINS. Mechanical articulator and grinder.

No. 1,324,476, to SAMUEL G. SUPPLEE. Denture-attaching device.

No. 1,324,521, to STEPHEN V. ROWBITZKY. Dental plate.

### *December 16.*

No. 1,325,426, to WILLIAM WATSON. Dental instrument.

No. 1,325,447, to VINCENT J. LUONGO. Attachment for dental engines.

No. 1,325,498, to SIDNEY KANEYE. Rotary toothbrush.

### *December 23.*

No. 1,326,089, to DAVID H. PAYNE. Dental instrument.

### *December 30.*

No. 1,326,552, to CLARENCE C. VOGT. Temporary dental cement or stopping.

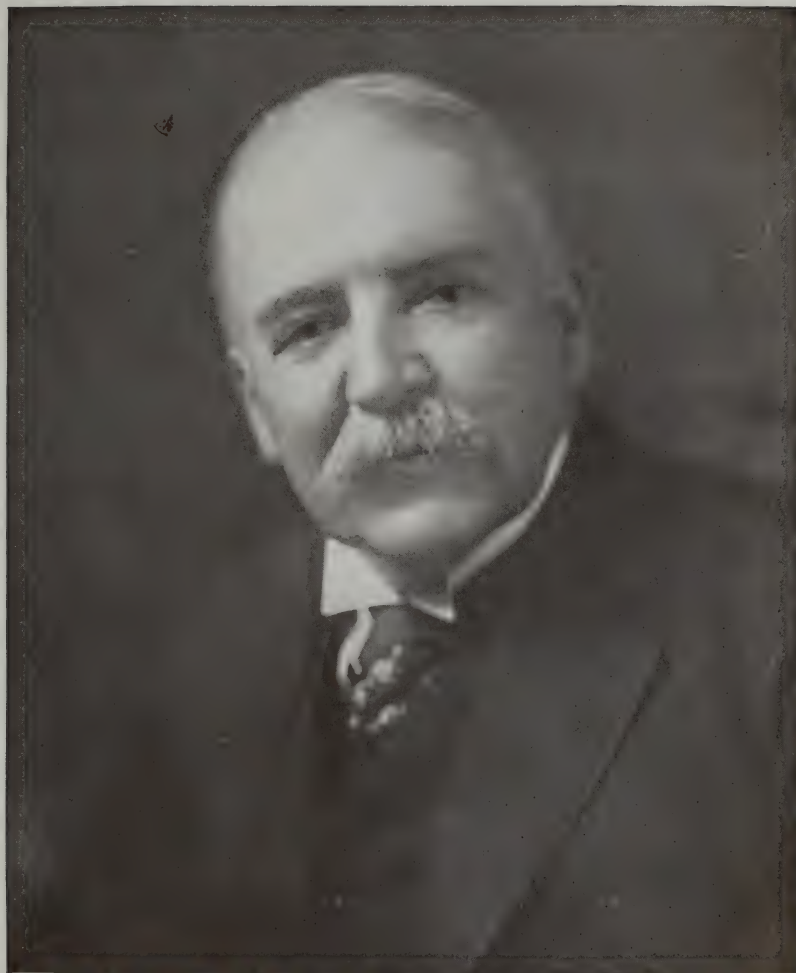
No. 1,326,638, to LOUIS A. BLOCK. Toothbrush.







DR. HENRY W. MORGAN.



DR. B. HOLLY SMITH.





# THE DENTAL COSMOS

VOL. LXII.

MARCH 1920.

No. 3

## ORIGINAL COMMUNICATIONS

### Observations on War Surgery of the Face and Jaws.

By V. H. KAZANJIAN, C.M.G., D.M.D., Boston, Mass.

(Read before the annual meeting of the New Jersey Dental Society, Atlantic City,  
July 16, 17, 18, and 19, 1919.)

THE treatment of wounds of the face and jaws may be divided into two distinct periods. The first, or early period, which covers the three to four weeks following the receipt of the wound, is the most critical for the patient. This is the period of initial exhaustion, of loss of blood, of pronounced sepsis, and of great pain and mental depression. This is also the time at which alarming complications, as broncho-pneumonia, secondary hemorrhage, and general infections are most likely to occur.

After this critical first period, the patient passes through the second period, and the convalescent period is in sight. At this time, depending upon the severity of the case, the treatment of the patient is confined chiefly to the further repair of the bony tissue by means of splints, to the construction of prosthetic appliances, to minor operations, and to plastic operations for the reduction of the facial deformity.

Throughout the war many problems

of surgery of the face and jaws were the subjects of keen discussion, and naturally many different opinions existed as to the procedure in different phases of the treatment. Some of the problems of special interest to the dental surgeon are herein outlined.

#### FIXATION OF THE MAXILLARY BONES.

During the past years many types of splints and special devices for the repair of maxillary fractures have been offered to the dental profession, and it would seem to the average student that there existed a confusion of appliances, with every author and designer insistently advocating the device of his own construction. But if the evolution of the treatment of gunshot wounds of the face and jaws be analyzed, it becomes clear why so many splints and methods were presented. Individual dental surgeons were influenced by the kind of cases which they had under treatment, by the

severity of these cases and especially by the degree of co-operation which they had from their medical and surgical associates.

Mechanical devices are used for the fixation of the bony fragments, for the support and control of the soft tissues, and for the restoration of function of the upper and lower jaws. In the first two instances the appliances are used to bring about the immediate or early im-

FIG. 1.



mobilization of the parts affected, or to produce a gradual reduction of the deformity. During the early period of treatment the tissues of the face are greatly inflamed, but nevertheless the bony parts respond readily to treatment and tolerate the application of splints. As the wounds proceed to heal, the cicatrization tends to maintain, and even exaggerate, a deformed position of the fragments of the jaws. In the latter event, fixation of the fractured portions in their proper position by immediate methods is difficult or impossible, and therefore procurable only by some method of gradual reduction. It will be

seen that the best results ought to be obtained by methods of immediate fixation, and that those devices which effect immediate immobilization are less complicated mechanically than those designed to bring about a slow and gradual reduction.

During the earlier part of the war the failure of the general surgeon and the dental surgeon to agree on the part which each should play in the treatment prevented the appreciation of the value of immediate fixation of the bony tissues, and many cases of gunshot wounds of the face and jaws became grossly deformed as they passed to and fro, now under the care of the surgeon, now under the care of the dentist, while each in his own way attempted to carry out a scheme of treatment. The better results were obtained only after genuine co-operation of the dental and general surgeon, and after one scheme of treatment made possible the application of splints immediately, while at the same time the general condition of the patient received proper attention.

There were critics of the early insertion of maxillary splints who maintained that appliances in the mouth greatly increased the sepsis, but their views gave way in the face of overwhelming clinical evidence to the contrary, and of better results which demonstrated that immediate immobilization was an essential factor in the reduction of inflammation. It is also important to note that with methods of early fixation the patient is more comfortable, takes nourishment with greater facility, and has a feeling of confidence and courage because a constructive step in his treatment has been taken.

Prior to the application of splints loose and detached spicules of bone, fractured alveolar process and teeth, and roots in the line of fracture must be removed, though the dental surgeon must use sound judgment in preserving small segments of bone which are displaced, yet vital and genuinely adherent to the soft tissues. In general this procedure is accepted; and yet some dental surgeons wavered because of a keen desire to save

sound teeth, not realizing that teeth in On the other hand, bold and extensive  
a severely comminuted area, or in a line extraction involved an unnecessary sac-

FIG. 2.

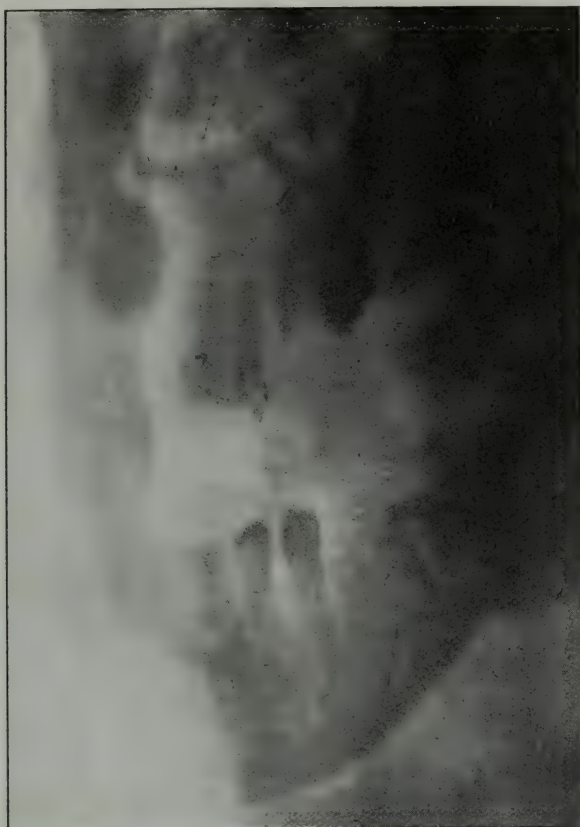
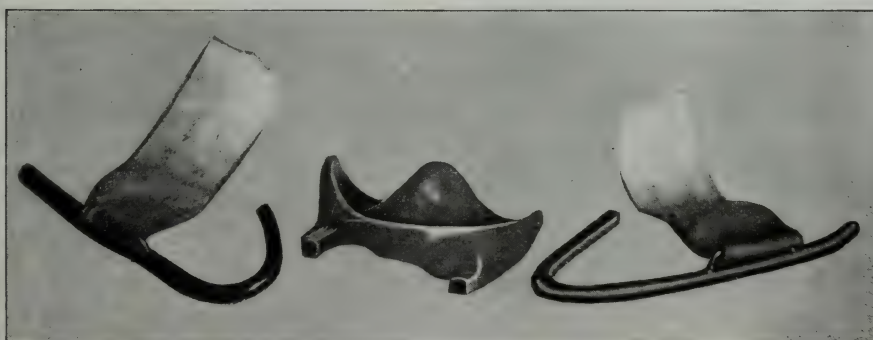


FIG. 3.

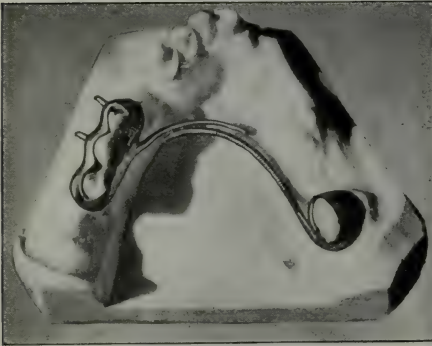


of fracture, were nothing but foreign bodies which prolonged the suppuration. rifice of teeth, and more especially meant the loss of the most valuable means of



retention for splints and subsequent oral restorations. It seems advisable to adopt

FIG. 4.



a middle course which admits of the removal of teeth which are obviously useless, but which retains the teeth while

FIG. 5.



they serve a purpose and are not a menace to the progress of the case under treatment.

#### THE OCCLUSION OF THE TEETH AS A GUIDE FOR THE FIXATION OF SEGMENTS.

Previous to the war if a surgeon was called upon to treat a fracture of the mandible, in many instances he approximated the segments with wires or metal plates without special regard to the occlusion of the teeth, while the dentist, in attending a similar injury, almost invariably applied intermaxillary liga-

FIG. 6.



tion, or immobilized the jaw by some form of splint attached to the teeth which brought the jaws and teeth into natural occlusion. During the war dental surgeons as a rule regarded the normal occlusion of the teeth as the true guide for the reduction of a fracture, except for a few who questioned the procedure on the ground that the majority of fractures caused by weapons of warfare were attended by a distinct loss of bony tissue; a condition which would prevent consolidation if normal occlusion were restored. And so, following the same line of argument, this minority urged that an approximation of the fragments

was preferable, in order to insure bony union at the expense of occlusion of the teeth.

The outstanding fallacy of this argument was the assertion that a comminuted fracture implies a loss of bony continuity; a fact which is true in exceptional cases, but *not* in the vast majority. Even though teeth, alveolar process and bone at the site of injury have undergone considerable comminution, there still remains in most instances an osseous continuity.

After dental surgeons had gained in clinical experience, it was demonstrated that bony consolidation took place in what were oftentimes regarded as unfavorable cases, provided, of course, that adequate immobilization was effected. The regenerative power of the bone following injury is something which cannot in many cases be ascertained during the earlier days of the treatment. In the event that consolidation does not result, it is better to have the remaining portions of the mandible in satisfactory occlusion, as this condition is more favorable for the insertion of oral restorations and for bone graft operations.

The natural occlusion of the teeth has served as a safe guide for the alignment of the segments of the mandible, while modifications of this practice are better left for application in very rare and peculiar cases.

#### EARLY SUTURING OF WOUNDS.

In the treatment of gunshot wounds of the face and jaws the soft tissues deserve the same careful attention that is given to the bony structure. Some surgeons insisted that facial wounds should be sutured as soon as possible, while others were equally certain that this procedure was wrong. The advocates of early suturing pointed out that if the lacerated borders of the facial wounds were left unsutured, ugly scars would result. Opponents of primary suturing claimed that little progress in the case could be made in the presence of sepsis, and that the necessary drainage of the wounds could not be maintained if

attempts were made to bring the borders together.

In brief, only such parts of a wound may be sutured as are really clean. If outlying lacerations are clean while the deeper portions remain septic, then the former parts in many cases should be sutured. When flap operations are to be carried out, it is universally conceded that the tissues must be in a clean and

FIG. 7.



healthy condition, and must have practically their full contraction.

All the successive steps in the treatment of a case of gunshot wound of the face and jaws are directed toward the control and elimination of sepsis, to the best possible repair of the bony tissue, to the return of normal facial appearance, and to a restoration of health. When the methods of treatment do not lead toward these ideals, then the methods are questionable.

The following histories of cases illustrate many of the problems presented, and also outline certain splints and appliances used in the treatment:

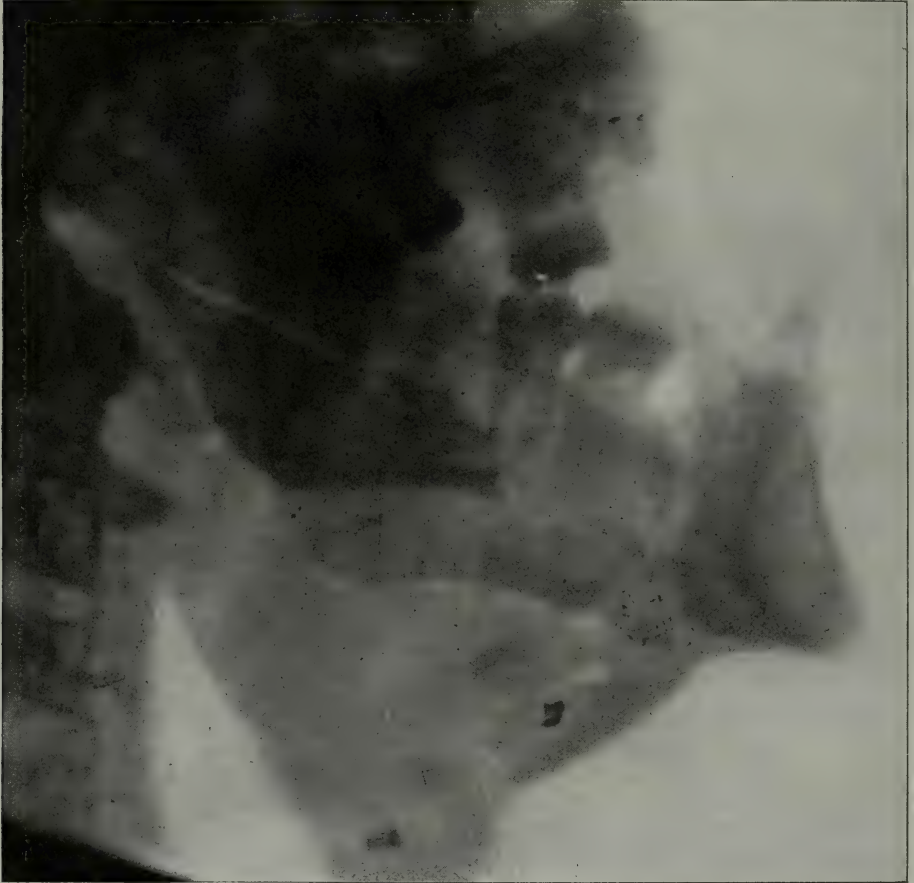
Pte. H—— was wounded on July 30, 1915, and admitted to hospital on Aug. 17th. There was a large wound of the right cheek which extended from the corner of the mouth nearly to the ear. The tongue was destroyed anteriorly as far as the frenum. (Fig. 1.)

The maxilla was fractured into three sections, and all teeth, with the alveolar process,

of the fractured maxillæ were greatly displaced.

The following means were employed to control the fractures: A Kingsley bar plate, with headgear, was fitted to the maxilla. A sectional band and arch splint were adjusted to the posterior teeth of the mandible. Intermaxillary elastics were applied between hooks,

FIG. 8.



were destroyed except the third molars. These latter teeth, however, were unerupted. There were three fractures through the mandible: (1) anterior to the left first bicuspid, (2) at the left angle, and (3) between the right bicuspid. (Fig. 2.)

The patient was in a critical condition upon admission because of lack of treatment. The wound was extremely foul, and the segments

attached to the upper and lower splints, to control the fracture at the left angle. (Figs. 3 and 4.)

On Oct. 18th the jaws were cleaned of all useless roots and alveolar process, so that the only remaining teeth and roots were the upper third molars (exposed for purpose of splinting), the roots of three upper incisors, the right lower third molar, and the left



FIG. 9.



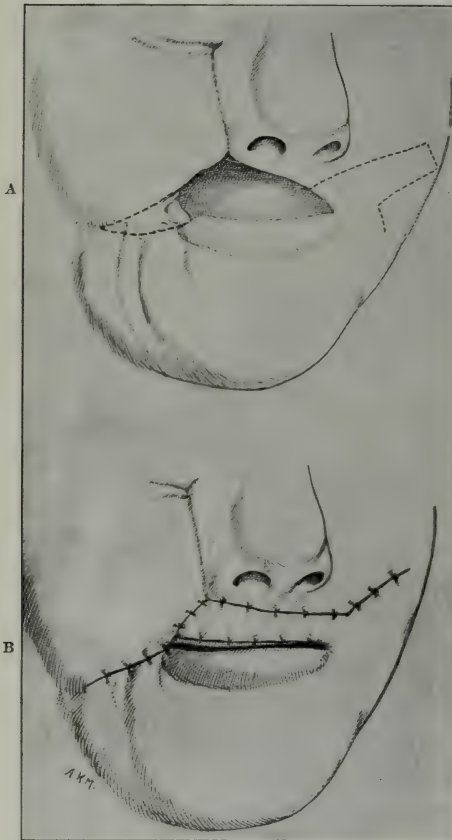
FIG. 10.



bicuspid. By this time the segments of the two jaws were in a satisfactory position, so that it was possible to apply upper and lower bands and arch splints for the immobilization of the parts of each, while the use of intermaxillary ligation was continued.

On Oct. 25th it was necessary to open externally an abscess which had developed at the left angle.

FIG. 11.



Consolidation of the fracture progressed favorably, and on Dec. 16th the splints were removed.

An upper denture was made which was retained by Roach attachments on a bar attached to the roots of the incisors. The lower denture was retained by ordinary clasps on the remaining teeth. (Fig. 5.)

A plastic operation was performed to improve the right angle of the mouth. On Jan. 7, 1916, adhesions to the lower ridge were

cut. On Jan. 22d the frenum of the tongue was cut to give added length to the tongue.

The patient was evacuated to England on Feb. 5, 1916. The dentures were efficient and the fractures of the maxillæ were uniting in a satisfactory manner. (Fig. 6.)

Pte. B— was wounded on July 19, 1916, and admitted to the hospital on July 22, 1916. There was a large wound on the right side of the face which extended from below the right eye to the side of the chin. The cheek and both lips were severely lacerated, with some loss of soft tissue. (Fig. 7.) The

FIG. 12.



floor of the right orbit was fractured. The upper jaw was comminuted on the right side with considerable loss of tissue. The lower jaw was comminuted severely on the right side, with extensive loss of bony tissue and downward displacement of the remaining small fragments. (Fig. 8.)

On July 25th the patient developed a superficial cellulitis, which spread over the face and forehead. The inflammation had disappeared by July 29th.

On recovery from this complication the patient was supplied with an intermaxillary vulcanite splint, constructed in two sections to facilitate introduction into the mouth, which procured a good alignment of the re-

maining parts of the maxillæ and also supported the soft tissues.

On August 11th an operation was performed. Several small useless pieces of bone were removed, two large fragments of the mandible were approximated by means of sutures of silver wire, and the tissues of the face were partially sutured. (Fig. 9.) On Aug. 20th the right antrum was opened to allow more adequate drainage. On Oct. 27th the patient developed cellulitis a second time,

On March 6th the upper lip was reconstructed, utilizing a unilateral flap from the left side of face, as seen in Figs. 11 A and B. At five subsequent dates, March 30th, May 21st, July 1st, Oct. 2d, and Nov. 3d small operations were performed to make alterations and improvements in the facial appearance. Massage and the application of the violet ray were used during the period of convalescence to increase the vascularity and softness of the soft tissues. The patient was

FIG. 13.



and of a more severe character. This was subsiding at the end of about ten days.

Fig. 10 shows the condition of the face on Jan. 16, 1917, at which time a series of plastic operations were begun for the reconstruction. There was a heavy scar extending from the right corner of the mouth toward the angle of the mandible, and the greater part of the upper lip was missing.

On Jan. 16th as much of the scar tissue as possible was removed, as a preparatory step for further plastic operation, and impressions were taken for a second splint of the type first inserted. On Feb. 2d the lower lip was raised by a flap, which also served to fill the gap in the right cheek.

evacuated to England on April 21, 1918. The appearance is shown in Fig. 12. There was bony union of the mandible. (Fig. 13.) Oral restorations were supplied, which gave the patient efficient mastication.

The bony tissues showed unusual vitality for repair in this case, in spite of the great destruction of tissue which was followed by extensive suppuration. There was complete bony union when the patient was evacuated to England. Great difficulty was experienced in the construction of artificial plates, owing to the inelasticity of the cheek tissues and the distorted condition of the alveolar ridges.

Pte. D— was wounded on March 28, 1917, and admitted to hospital on March 30th.



There was an extensive shrapnel wound of the lower lip, with considerable laceration prior to the bicuspid, and the only remaining lower tooth was the right second bicuspid.

FIG. 14.

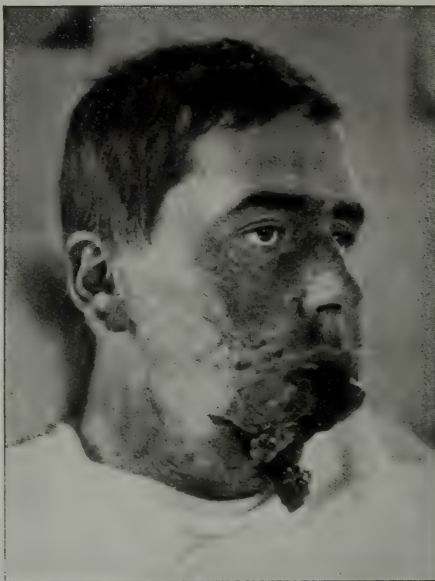
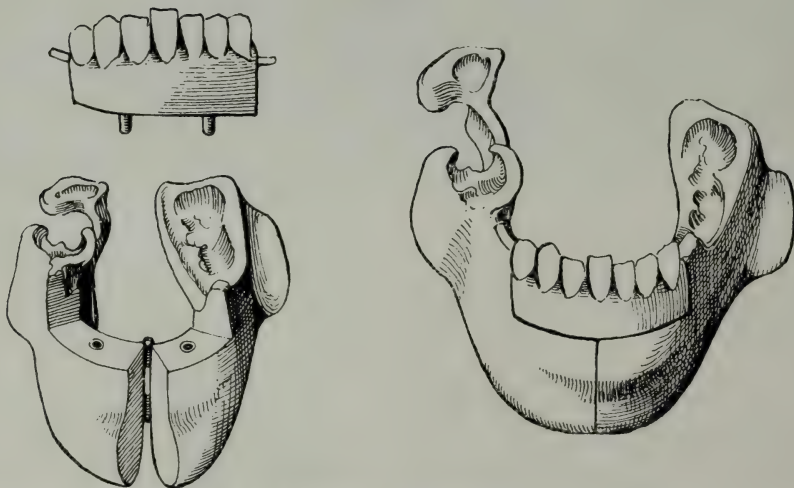


FIG. 15.



The type of appliance used as a substitute for missing portion of the mandible as shown in Case III.

and loss of the chin and sublingual region (Fig. 14.) The mandible was destroyed ante-

On April 7th an operation was performed to remove useless pieces of bone and to suture

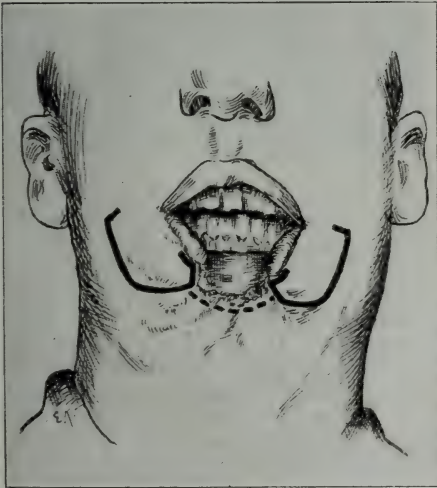
minor radiating portions of the wounds. A splint was adjusted which maintained the cor-

the alveolar ridges of the mandible and reproduced the mental contour. It was hinged at the median line to facilitate introduction to the mouth, and once in position, was re-

FIG. 16.



FIG. 17.



rect anatomical relation of the remaining parts of the mandible.

On July 28th the soft tissues were sutured in the following manner: An appliance was made and adjusted in the mouth which fitted

FIG. 18.

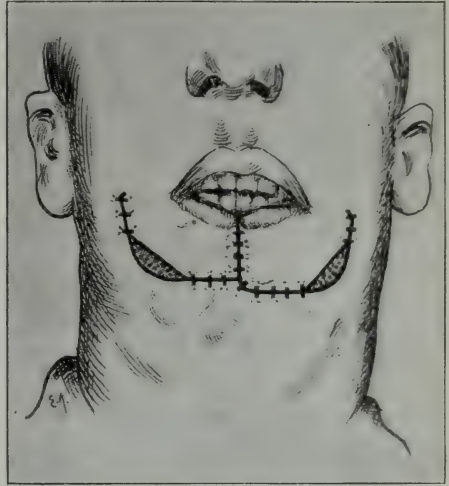
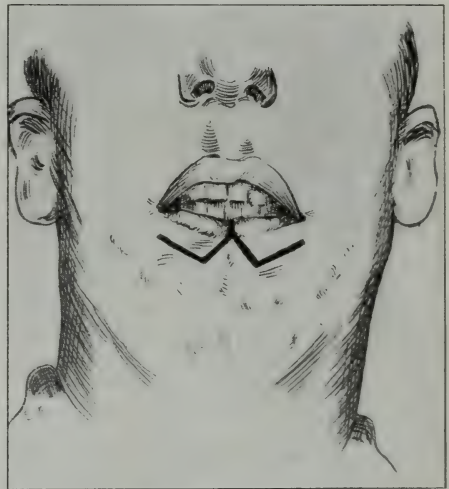


FIG. 19.



tained by the occlusion of the upper teeth. (Figs. 15, 16.)

*Operation.* The mucous membrane was divided along the buccal grooves as far as the second molar regions, and from these points the incisions were carried vertically upward through the buccal tissue. The corresponding

superficial incisions were made along the lines of the lateral scars. (Fig. 17.) The large rectangular flaps thus obtained were stretched forward and sutured at the median line; the underlying mucous membrane with catgut, and the skin with horsehair. (Fig. 18.) The artificial appliance was placed in position prior to the completion of the suturing.

After healing had taken place, the middle of the lower lip was drawn slightly downward, and on Oct. 27th a second operation was performed. Incisions were made in the

which permits of partial function, and to keep the alveolar ridges definite and free from adhesions.

The extensive loss of the mandible does not permit early suturing, and therefore all operations are limited to those designed to promote the decrease of sepsis, or to those for approximating radiating parts of the wound.

Only after all parts of the wound are clean, and after the remaining portions of the mandible are in good anatomical position, is a

Fig. 20.



lower lip, first running downward, and then horizontally, to produce two small flaps, which were raised and sutured. (Figs. 19, 20.) By Dec. 3d a prosthetic restoration of the missing lower tissue was completed. This consisted of a hinged vulcanite denture giving good occlusion, and having the proper bulk to give a good mandibular contour. (Fig. 21.)

The patient was evacuated to England on Dec. 10th.

*Remarks.* Since in this case there was a pronounced loss of the mandible anteriorly, it is obvious that bony continuity could not be restored. It is imperative, however, to keep the mandibular "stumps" in a position



definite plastic operation for complete closure of the wound practicable; and then the construction and insertion of a prosthetic appliance is necessary to give the proper contour to the face. Later an oral restoration is constructed of the same general form as the earlier appliance, serving as an efficient aid to mastication. A case treated in the foregoing manner is satisfactorily prepared for a bone graft if this seems advisable and likely to insure a more efficient mandible.

HARVARD UNIVERSITY DENTAL SCHOOL.



# Histo-pathology of the Jaws and Apical Dental Tissues.

No. VIII:

## The So-called Glands of Serres.

By EUGENE S. TALBOT, M.D., D.D.S., Chicago, Ill.

VERY little is found in textbooks about the glands of Serres. Most of those who mention the subject or name do not index them; those who do mention the subject have very little to say about it. It seems, therefore, to be a very dry subject, and one in which very little research work has been done in the past eighty years.

Serres, according to the history of dentistry, must have lived in Paris after about 1790. In 1817 he published his "Essai sur l'anatomie et la physiologie des dents." Very little or nothing is known of his works.

Tomes\* dismisses the subject in the following words:

Small round aggregations of pavement epithelium are met with at a little depth, or even bedded in the surface; these, the "glands" of Serres, have no known significance. In the neighborhood of developing tooth-sacs epithelial aggregations of similar appearance are to be met with, and in such spots are remains of the neck of the enamel organ, which has undergone this curious change subsequently to the completion of its original function.

Black† states:

That part of the gingival margin that lies in against the neck of the tooth is of a different structure from its other parts. Here it is clothed with very soft, round, or polygonal gland-like epithelium that suggests the formation of a gland, but fails to assume the glandular structure, though it seems to have been regarded as such by Serres. This, which I shall call a gingival organ, emits a pro-

fusion of small rounded cells which are always found in the saliva. (Salter) and are usually called mucous corpuscles. It is well known that certain glands have the power of the selection and excretion of certain poisons, and in this way of eliminating them from the system, and that in the passage, if the substance be in large amount, hyperemia, or even inflammation, may result. It is also known that mercury and iodide of potassium will produce inflammation of the free margins of the gums, and Salter has found that these cells are in greater abundance under these circumstances; also that the cells taken from the gingival border and submitted to chemical tests after the person has taken the iodide of potassium are found to yield and are tinged with iodine.

Black quotes Salter twice, but I have been unable to find anything Salter has said about the so-called "glands of Serres." At least he does not index the name or subject. Black, in his work upon "The Periosteum and Peridental Membrane," and also in his article in the "American System of Dentistry," seems to have in mind glands and glandular structure, and therefore quotes Salter because he speaks of the gum margin "emitting a profusion of small round cells which are always found in the saliva," and because "potassium iodid once administered, chemical tests showed a tinge of iodine in the cells taken from the gingival border." Black sheds no light whatever upon the subject.

In my work\* published in 1899, I stated:

\* "Dental Anatomy."

† "American System of Dentistry," p. 955.

\* "Interstitial Gingivitis or So-called Pyorrhea Alveolaris," p. 53.

The mucous membrane under the microscope appears at a point between the teeth (and faintly so at the inner and outer border as shown by Black) to double upon itself. When the tooth erupts, absorption of the gums occurs at the highest point. The gum tissue passing down to the neck of the tooth folds or crowds upon itself between the teeth with a peculiar curve downward, inward, and then outward and upward. At the upper

in sheep). This in itself seems to offset the glandular theory, since gingivitis almost invariably starts on the lingual or palatine and labial surfaces where this structure does not appear. In the slides of the scurvy case there does not appear the slightest evidence of anything resembling glandular structure. Hence it would seem safe to conclude that the glandular structure does not occur in this locality. It is by no means impossible that in

FIG. 1.



(Magn. 60.)

border, about midway from the gingival margin to the neck of the tooth, may be seen a space or pocket (never twice alike in appearance) where the edge of the gum tissue comes in contact with the original epithelium. Sometimes the space or pocket is closed up. Again it remains open. Frequently this peculiar type of structure is absent, showing that the fold of gum tissue either has been absorbed in the eruption of the tooth or did not form. This peculiar form encircles only a portion of the neck of the tooth (according to Black's examination of the structure

the peculiar epithelium in this locality, epithelial cells undergo changes which to some observers simulate glandular structure but on histologic analysis are distinguishable from it, resembling in this the crypts of the head of the penis.

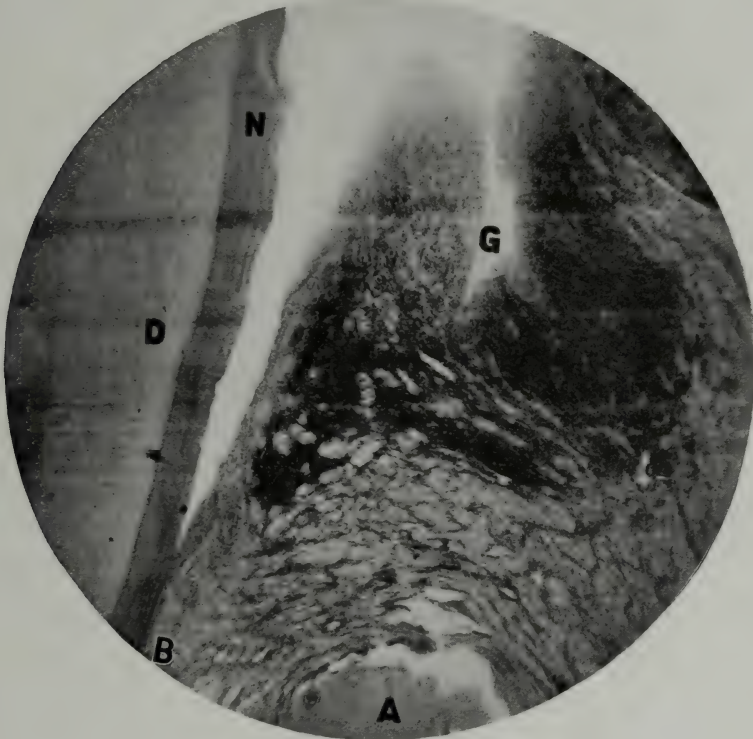
For more than twenty-five years I have studied the gum tissue under the microscope in relation to interstitial gingivitis and pyorrhea alveolaris, with a view to ascertaining its relation to local

and constitutional irritants, and at the present time I am unable to change my views from those expressed in my work quoted above.

Fig. 1 shows *A* the alveolar process, *B* the peridental membrane, *D* the dentin, *G* the so-called gland of Serres, and *N* the so-called Nasmyth's membrane. This

this picture as a whole, from the magnification one would be likely to say at random that it was a gland. Although it is filled with epithelial cells, they are not all living cells, nor are they arranged uniformly around the surface of each group of structures as they appear in normal glandular tissues.

FIG. 2.



(Magn. 45.)

specimen, taken from the neck of the tooth of a dog, is the best illustration of the structure called a gland that I have ever seen. In this particular picture the gingival space is located between the so-called gland and so-called Nasmyth's membrane. Nasmyth's membrane is still attached to the crown of the tooth. Usually the membrane is on the side next to the so-called gland. In this case the gingival space is located between the gland and the membrane. Looking at

Fig. 2 shows the other extreme, on the opposite side of a human molar tooth: *A* is the alveolar process, *B* the peridental membrane, *D* the dentin, *G* the so-called gland of Serres, and *N* the so-called Nasmyth's membrane attached to the crown. In this picture there is nothing gland-like in appearance. It shows the gum tissue crowded and twisted, turned upon itself into a pathologic mass. There is an open space extending from the center upward to the surface. In



both pictures the tissues between the so-called gland and the edge of the alveolar process are jammed together by pressure between the two crowns. The fibrous tissue may be seen extending from the neck of the tooth, passing over the edge of the bone and up and around both sides of the so-called gland. Inflammation extends through the entire picture. In some slides the tissues are perfectly normal in their development, without the least appearance of pathologic structure. In such cases the tooth was perfectly smooth upon the approximal sides, and there is no crowding against an adjoining tooth. Such pathologic structures, especially as seen in this picture, are easily inflamed by the local and constitutional irritations setting up a veritable interstitial gingivitis.

Owing to the peculiar pathologic condition of this structure and the remains of the external layer located in the gingival space, dead epithelial cells are continually being thrown out, collect in the tissues and in the saliva, and are called by Salter "mucous corpuscles." Naturally a larger number of so-called

"mucous corpuscles" would be found in connection with a pathologic condition and in the saliva than in normal, healthy glandular structure.

Salter says (speaking of mercury and potassium iodid) that "the cells taken from the gingival border and submitted to chemical tests after taking potassium iodid are found to yield and are tinged with iodine." While this is possibly true, I have shown in former papers that the staining process in the laboratory has an affinity for epithelial cells. The nuclei are granulating and general degeneration is taking place. These cells take on a purplish appearance. It would seem, therefore, that this mass of material is pathologic and not physiologic in its nature, therefore cannot be called a "gingival organ," and it is purely mechanical in its development. The tooth passing through the gum tissue resembles the head of the penis passing through the foreskin, and as it reaches the glands the foreskin rolls upon itself, forming folds and depressions.

31 N. STATE ST.

(To be continued.)

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## Removable Bridges.

By J. J. MOFFITT, D.D.S., Harrisburg, Pa.

(Clinic given at the University of Pennsylvania, Alumni Society Reunion, June 1919.)

EVER since the conclusion has been arrived at by medical and dental authorities that the invasion of the human race by pathogenic micro-organisms is responsible for some of the most serious diseases of mankind, it has become the duty of the physician and dentist to give particular attention to all locations where such micro-organisms can find a lodging-place for incubation. One of these places of infection we know is in the teeth and their adjacent tissues, which places an added responsibility upon the dentist for the hygienic condition of each mouth.

When tooth destruction has gone on to such an extent that the operator considers it necessary to extract one or more teeth in order to prevent systemic infection, it becomes necessary to replace these teeth with artificial restorations.

It is obvious that the more closely these artificial structures resemble the original teeth and the more easily they can be cleansed, the more valuable they will be. We formerly made Richmond crowns and shell crowns for bridge abutments, and replaced the intervening teeth with "dummies," usually facings backed with gold and swung between the abutments by means of solder. Now we have found that while these bridges are strong and useful, there is a better way of restoring the lost teeth for patients who desire it. The removable bridge is the most interesting and exciting addition to dentistry that has occurred for many years. Of course we have been making them for fifteen or twenty years without any very definite system, but lately many of the obstacles have been

removed, and the probable results to be obtained in each case are more easily determined. The exciting element in removable bridge work is shared by the patient as well as the dentist. Adjusting the retention to the proper degree cannot always be accomplished at once, and some patients take weeks to learn how to replace the bridge when it is taken out. This difficulty usually arises in the case of an anterior bridge, just before a dinner party, and you have to break in on your evening relaxation and take a taxicab to the patient's residence. Sometimes when the adjustment is not yet completed and the patient is suddenly called away on a pleasure trip, the refractory bridge will plunge into the soup or onto the floor in a hotel dining-room, and the patient comes back in wrath at the embarrassment you have caused.

Once in a while you cannot make them believe it was anything but incompetence on your part, and they go to a dentist of an older school, who smiles at the folly of all your painstaking work and promptly cements the bridge on to its abutments. But, on the whole, removable bridges are a great success, and patients develop a real affection for them. Especially older ladies who have been a month or more learning to use them acquire a greater admiration for their own skill in being able to replace the bridge without a mirror, than for yours in constructing the appliance.

Removable bridges cannot always be made for various reasons, financial and physical, but when they can they are by far the most satisfactory and safe method of restoring lost teeth. There are dif-

ferent kinds of removable bridges: The first ones fastened with clasps; the shell crown attachments sliding over cylindrical shell crowns that often had to

FIG. 1.



Impression tray cut for applying pressure to saddle.

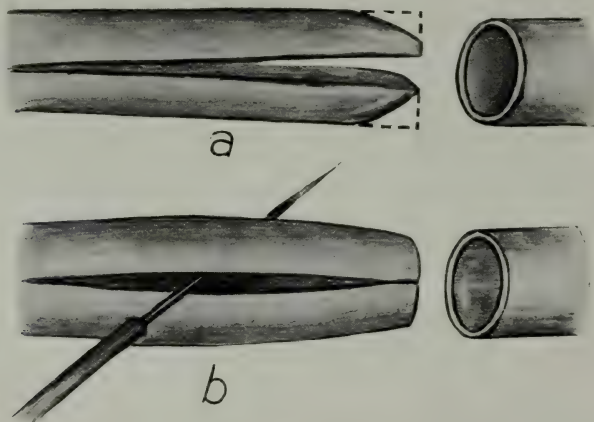
be fastened with chloro-percha, and were then removed only when the teeth were cleaned; then the homemade tubes and pins of platinum, which were arduous undertakings for the dentist, and

The retaining friction can be easily controlled and made greater or less, if the pins are properly bent in the beginning. By casting the tubes into the fillings the abutments can be made with no part projecting beyond the tooth, making cleansing conditions perfect. By the use of a ridge plate or "saddle" cast or soldered to the removable parts of the abutments, the bridge can be made the same shape as the natural structures. The use of the ridge plate also enables the operator to distribute the force of mastication along the gums, and not make one or two supporting teeth bear the stress of six or eight masticating surfaces.

#### THE SPLIT-PIN AND TUBE ATTACHMENT.

I have found from the questions asked at clinics and also from my own experience that there are a number of obstacles in the way of removable bridge work of the split-pin and tube variety. One of these difficulties is making a saddle rest

FIG. 2.



*a.* Wrong way—spread and beveled, because it would not enter tube.  
*b.* Correct way—bent around fine steel bristle.

now we have the various manufactured attachments to be cast to, or soldered on to the bridge, including the machine-made tubes and split-pins. The last-named method is the one that seems to have the greatest number of advantages.

firmly on the gums, so that in a one-end attachment it will not rock and loosen the supporting tooth. To do this, when the abutment in the tooth is complete and the saddle has been swaged the abutment and saddle are put in the mouth



and the impression taken of them in the relation desired, as follows: A hole is cut in the most suitable part of the impression tray through which an instrument can be placed on the saddle, which will enable the operator to hold the saddle or the base of the bridge down, and overcome the elasticity of the gums as the plaster is setting. (Fig. 1.) This overcomes the leverage often exerted on the supporting tooth, which has made one-end attachments seem impractical to many operators, and also insures the distribution of the mastication force along the ridge, where there are several attachments. By thus getting the relations of the parts under stress a bridge replacing the upper bicuspids and molars can be successfully retained with but one pin and tube in the canine, if the planes of occlusion neutralize any force occurring in mastication that is not exerted parallel to the pin and tube. This method of taking the impression does not apply to the short process I shall describe here, but is necessary in larger bridges where the saddles must be swaged.

Swaged saddles can be greatly improved by having a rim cast around the edge after the marginal extent has been determined. These larger bridges, especially in upper cases, are often too heavy if made entirely of gold.

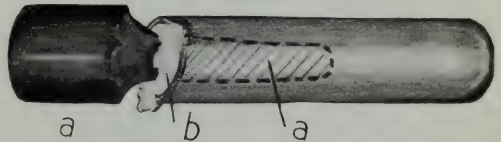
The teeth should be fastened on with base-plate gutta-percha for several weeks until the exact articulation is arrived at, and then fastened in that position with vulcanite or made into a porcelain block and cemented onto the bridge. This is done by burnishing platinum foil to the saddle, waxing the teeth to it, articulating, and then investing and baking pink porcelain in the place occupied by the wax. This, with a cast gold rim on the saddle to protect the edges of the porcelain, makes the most desirable form of removable bridge.

Another difficulty is that when a split-pin is spread so that it makes the bridge more secure the ends will be too wide for the tube, and the patient cannot replace it unless these ends are beveled down. This causes a loss of friction surface, and in short pins makes them almost useless.

Instead of beveling these edges place a fine bristle between the two parts of the pin about half-way from the end, and while keeping it in position squeeze the ends together with a pair of pliers. (Fig. 2a.) When the bristle is withdrawn the ends of the pin will be in the same diameter as they were before, while the middle will be wider, and will furnish good friction in the tube. (Fig. 2a.)

Another difficulty frequently encountered is that very often the two parts of the pin become either cast or soldered together. This comes both from having wax on the pin, and from having it spread slightly when investing in the casting ring or for soldering. To avoid this difficulty have the pin thoroughly

FIG. 3.



Tube prepared for casting. a. Graphite.  
b. Investing compound.

clean before investing, for if there is wax or anything that can burn off, the gold or solder will flow in and unite the halves of the pin. If the pin is slightly spread and any crack can be seen a small piece of regulating wire can be twisted around the end before investing, to hold the halves tightly together.

Another difficulty encountered by operators is in having the gold in the casting of an abutment melt the tube and fill it up in the inside. This disaster is overcome by filling the tube with fine investment compound such as is used in porcelain work, and before it is hardened inserting into it a piece of graphite prepared from an ordinary lead pencil. (Fig. 3.) When this compound is set the wax is attached to the tube and the impression for casting made. The projecting graphite will aid in holding the tube in place in the casting after the wax has melted.

# TECHNIQUE OF MAKING A REMOVABLE BRIDGE FOR THE REPLACEMENT OF A FIRST MOLAR.

For the sake of brevity we shall describe the making of a removable bridge for the replacement of a first molar on the lower jaw where the second molar is vital.

Whenever the first molar has been lost it has usually been found that there is a filling in the second molar. If this is not the case a cavity is prepared in it in

FIG. 4.

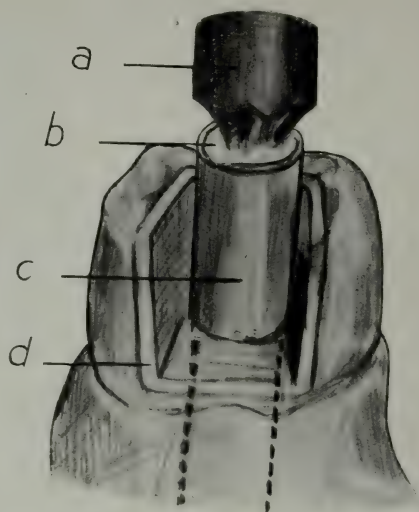


Wax impression for posterior abutment with sprue attached.

such a manner that when the wax is made for the casting it may be in turn scooped out, so that another filling may be made to fit into it for the attachment of the bridge and the support of its posterior end. (Fig. 4.) When this filling is complete it may be fixed into the tooth with chloro-percha temporarily. The sides of this telescoping cavity for the reception of the rear end of the bridge should be parallel to the pin which is to be inserted in the bicuspid. If the bicuspid is vital it is first devitalized, and then the root-canal properly filled. After this the top of the tooth, the occlusal surface, and the root-canal are suffi-

ciently enlarged for the reception of the tube. These tubes come in three sizes,

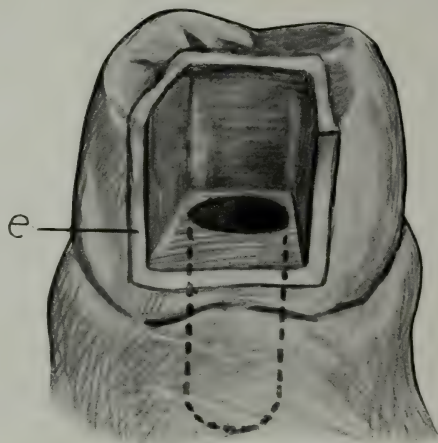
FIG. 5.



Preparation of anterior fixed abutment with tube and wax. *a.* Graphite. *b.* Investment compound. *c.* Tube. *d.* Wax.

large, medium and small; the smaller ones are usually used in the incisors.

FIG. 6.



Completed casting of Fig. 5 with projecting tube cut away.

After the bicuspid has been prepared, the tube, filled with investment and graphite



and having sufficient wax attached at the proper place, is inserted, and the wax pressed into place. Room for the inside filling that is to be cast to the pin is marked out with a sharp point, and the wax partially scooped out down to the tube. (Fig. 5.) A sprue is attached to one of the outer margins at the most suitable angle for casting, and the piece removed and cast. (Fig. 6.)

When the abutments are completed a plain vulcanite or a Goslee or a diatoric tooth is chosen to suit the case and trimmed mesially and distally so that there will be room enough for sufficient gold to give strength for the attachments to the removable parts of the abutments. (Fig. 7.) If the tooth is to be cast to

FIG. 7.

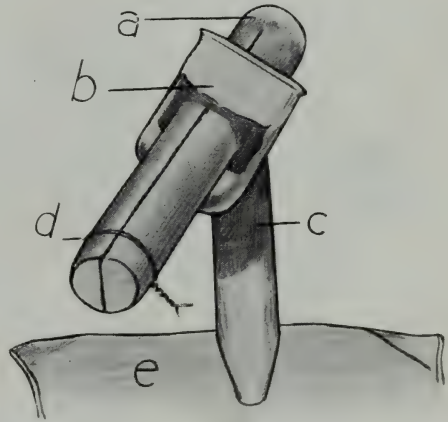


the bridge a plain vulcanite tooth with platinum pins is chosen, waxed up at the bottom, and pressed into place. This is removed and trimmed, and reinserted until it is properly shaped. The wax must be allowed to go up the sides of the tooth mesially and distally, to be attached to the abutments. Very often the posterior filling can be cast with this in one casting by allowing the wax to project back into the place for the reception of the posterior filling that has been inserted temporarily in the second molar. When this piece is completed and put into place and the casting containing the tube has been put with chloro-percha into the bicuspid tooth, the pin is inserted and the wax packed in around it for the anterior filling, in order to secure close adjustment and make the soldering easy. To make the inlay wax adhere to the pin, place a little sticky-wax on the pin just above the socket, then insert the pin in the abutment, and pack the inlay wax around it. (Fig. 8.) This is cast and fitted into the stationary

abutment. Never put the wax in first and push the pin through it, and never get any wax, grease, or other substance on the pin, as gold will flow in when casting. Avoid scratching or denting the pin, and never touch the inside of the tube with a steel instrument. When this anterior piece has been cast it is inserted into the mouth, and the other portion of the bridge put in place on the ridge.

It now remains to solder the two parts together in such a manner that when

FIG. 8.



Preparation for casting anterior abutment. *a.* Split pin. *b.* Wax pattern. *c.* Phonograph needle sprue. *d.* Fine wire to hold split pin together. *e.* Flat paraffin wax for ease in handling.

completed the saddle will rest firmly on the gums. The saddle must fit perfectly, so that pressure applied in the direction the occlusion will have causes no discomfort.

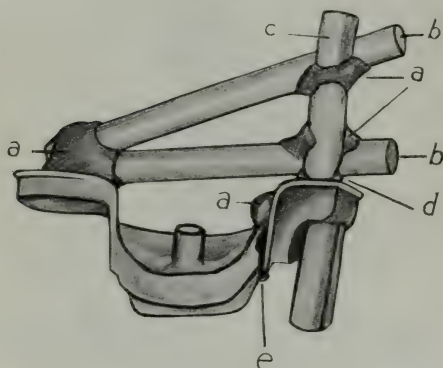
If observations have been made regarding the cusps of the upper teeth and sufficient allowance made for them during the procedure up to this point it will not be necessary to cut off the projecting split pin, which can be used for removing the entire bridge preparatory to soldering.

If it has been necessary to cut off the projecting end of the pin in order to get the occlusion, a piece of nickel silver wire is soldered to the top of the anterior



filling above the pin, in order that it may be easily withdrawn. When this is replaced in the mouth another piece of nickel silver wire is run back across the posterior part of the bridge, and attached to it with sticky-wax. The anterior part is attached with sticky-wax to the up-right wire, and another piece from the top of the wire to the posterior end of the bridge. (Fig. 9.) When everything has been pressed into place and the wax allowed to cool the bridge is withdrawn by pulling upward on the nickel silver wire soldered above the pin, or upon the

FIG. 9.



Fitting a small bridge for soldering without taking an impression. *a.* Sticky-wax. *b.* Wire braces. *c.* Wire soldered to pin abutment for removal of bridge. *d.* Low carat solder. *e.* Place where bridge is to be soldered filled with sticky wax.

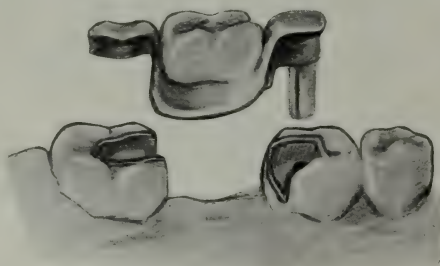
projecting pin if this has been allowed to remain. This is then invested below and allowed to harden after which the nickel silver wire and wax are removed. Additional investment is placed where it is necessary to protect the porcelain or to prevent the flow of excess solder, and the piece is ready for soldering.

It is not difficult to cast to the porcelain if the interior of the casting is sufficiently heated. This is accomplished by having two blowpipe flames, one on each side of the casting ring, heating up the investment but not heating the ring so very much. In this way a great deal of the heat may be sent to the center of the casting without overheating the ring, causing it to expand and cracking the

investment away from the ring. A little practice will enable one to cast every time without cracking the porcelain. Care should be taken to have the saddle rest tightly on the ridge, so that it will give considerable support to the bridge, and not put all the support on the teeth used as abutments. In this way the force of mastication is distributed evenly, there is not too much stress put on the supporting roots, and food is prevented from getting under the saddle.

There are some cases where devitalization of a pulp is contra-indicated, in which the various spring and friction devices made to avoid devitalization may

FIG. 10.



Finished bridge.

be used, but in the long run it is safer to have one good, well-made socket and pin, and a tight-fitting ridge plate or saddle for the protection of the other teeth.

A root-filling properly done where there has never been any inflammation or infection will produce no changes in the extra-apical tissues. (See paper in DENTAL COSMOS, December 1917, p. 1185.)

The chief advantages of this kind of bridge (Fig. 10) from a hygienic standpoint are that there are no overlapping edges nor fastenings of any kind that are difficult to clean. From a practical standpoint it is just as serviceable in upper as in lower bridges, and esthetically the attachments and metal parts may easily be concealed from view, and it may be so shaped that it is exactly like the original design of the mouth before the teeth were lost.

# An Investigation of the Physical Properties of Dental Materials.\*

By WILMER H. SOUDER, Associate Physicist,  
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NATIONAL BUREAU OF STANDARDS, WASHINGTON, D. C.

## I. Introduction.

A RECENT request from a branch of the Government, purchasing large quantities of dental supplies, resulted in the authors taking up a systematic study of the physical properties of certain filling materials, together with the instruments generally used in testing the same.

Properties, such as crushing strength, flow, thermal and chemical expansions, chemical composition, electrode-potentials and thermal reactions have been investigated. Additional phases, such as method of manipulation, time, temperature, etc., were found to exert definite influences in certain tests and indicated the necessity for their proper control.

It is believed that the discoveries in instruments will be of sufficient importance to justify lengthy descriptions since it was found necessary to discard practically all devices described in the dental textbooks. In the selection of instruments we have considered two features, *viz.*, accuracy and simplicity.

Some of the alloys included in this research were made to requested specifications; others were purchased in the open market; and many were submitted by manufacturers co-operating in the investigation.

Many of the results should be interpreted as comparative or relative tests. Since it is not our purpose to advertise the merits or demerits of any material,

the manufacturer's names have been omitted. Each has, however, been informed of the results found for his alloy. The purpose of this paper, as in all previous reports, is to place before those familiar with the use of dental materials, accurate and reliable data, together with a description of instruments suitable for measuring the properties investigated.

We have attempted to discuss some of our results on a purely physical basis. Their clinical interpretation is left to those experienced in the profession.

It is hoped that at a near date and with the co-operation of the manufacturers and users of these materials, it will be possible to write definite and proper specifications, which will enable the purchaser and user to secure articles of known qualities.

## 1. HISTORICAL.

It is practically impossible to give a complete bibliography of the researches on amalgam during its 75 years of existence.

The first amalgams were manipulated in a crude and empirical way, thus entailing an unusually large number of failures. In fact, the feeling against amalgam was so strong at one time, that anyone speaking favorably of its possibilities was immediately boycotted by the profession. And is it any wonder that failures were very conspicuous when we

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read of the crude practices and lack of definite data on the manufacture and manipulation of alloys? Opinions and speculations seem to have been considered of more importance than data or accurate statistics.

Despite the failures, the few successful restorations were so completely satisfactory that investigators started a search to find the essential properties and technique incident to satisfactory restorations. The works of the pioneers: Tomes, Fletcher, Hitchcock, Witzel and Flagg have been reviewed and elaborated by Black, who has probably done most to point out the necessity for accurate scientific tests. The chapter on Amalgams in Volume II of Black's "Operative Dentistry" (1914) contains a world of information on early work, together with the results of his own extensive researches.

More recent laboratory researches are recorded in the various dental journals under the authorship of Marcus L. Ward, Dean, University of Michigan Dental School, Ann Arbor, Mich.; A. W. Gray, Research Director, The L. D. Caulk Co., Milford, Del.; W. G. Crandall, Spencer, Iowa; C. M. McCauley, Abilene, Tex.; Wm. E. Harper, Chicago, Ill.; A. Fenchel, Hamburg, Germany; B. R. Bakker, Utrecht, Holland, and McBain & Joyner, Bristol, England.

The findings of these men are not concordant in all essentials and the lack of definite descriptions of instruments and manipulative details makes it difficult to explain all the results reported. It is hoped that the present article may clear up some of the points in question among the various investigators and also enable those interested in continuing the work to proceed with apparatus of unquestionable accuracy and simplicity.

## II. Instruments.

The first instruments of importance for systematically testing amalgams were those of Dr. Black's design, the micrometer and dynamometer. These were of the utmost value in securing qualitative information and inaugurated a new era in amalgam manufacture, but they

can scarcely be relied upon to give the most precise or decisive data. Few, if any, investigators are using them today. The writers are familiar with the apparatus used by Gray at Milford and by Ward at Michigan and feel sure that both types are an advance over the original apparatus of Black, and quite accurate for their researches.

### 1. THE BLACK MICROMETER AND WEDELSTAEDT TUBES.

Fundamental errors precluding the use of the Black micrometer for precision work are: (a) the mechanical impossibility (to date) of combining a system of levers and gears to operate a dial or mirror indicator which will accurately or consistently measure directly to  $\frac{1}{10,000}$  inch ( $2\frac{1}{2}$  microns). Scale divisions on an instrument are not always, although they should be, an indication of its approximate sensitivity. The elements of variance, passivity and backlash always enter where there is a multiplicity of moving parts. These features, as affecting instrument design, are fully treated in an article by F. J. Schlink (Scientific Paper 328 of the Bureau of Standards).

The Wedelstaedt tubes used with this micrometer are subject to criticism because of their restraining action on the amalgam specimen. Later it will be seen that, as shown below, the expansion of amalgam is about two and one-half times as large as steel; hence, on the least temperature rise the amalgam is frictionally locked against the sides of the tube and in many cases the excess expansion causes a bulging or "spheroiding" of its free surface. The same phenomenon will occur with chemical or crystallization expansions. Any later temperature drop will be accompanied by the larger contraction of the amalgam (see section on Thermal Expansion), thus giving the "black ditch" effect. A slight heating of one of these tubes of amalgam is sufficient to cause an apparent excessive expansion or spheroiding, followed by the ditch effect.

Again the "points" expansion are not in the same units as "points" contrac-



tion, since in the latter case the amalgam may shrink in all dimensions; whereas in the former the three dimensions of expansion have been forced into a three-fold one dimension of expansion, two of which are now manifest as flow, but recorded as expansion. This probably accounts for the claim of slight expansion and no contraction which is often made for alloys; whereas, in fact, there is contraction which is too small for detection with such apparatus.

## 2. THE BLACK DYNAMOMETER.

Little need be said about the dynamometer except that the results are of necessity irregular, due to the smallness of specimens. This smallness of specimen permits undue influence from slight variations of manipulation, mixing or packing. Cubical forms are not well suited for these crushing tests. The exposed corners and equal dimensions are factors which should be avoided. For the proper test of compressibility, as outlined by the American Society for Testing Materials, specimens should be prepared in cylindrical form, 1 inch in diameter and  $2\frac{1}{2}$  to 4 inches long. Special attention is directed to the necessity of using specimens with a length greater than the diameter in order to avoid the "barrel" effect in case there is a tendency toward flow.

## 3. THE FLOW ATTACHMENT.

Some types of dynamometers are equipped with an auxiliary flow dial which records the motion of the compression rod as the pressure is applied for crushing. The objections offered above apply equally well against this attachment as an instrument of precision.

The sudden shock given the levers and dial parts at the instant of rupture is sufficient to disturb the bearing surfaces and adjustments of all parts of the instrument.

## 4. OPTICAL MICROMETERS AND COMPARATORS.

Unless handled by a person skilled in their use these instruments are of little

value. The accompanying figure is included to explain the error possibilities of devices depending upon microscopes. Fig. 1 A and B are photographs of the same tooth with absolutely no changes of position of microscope or tooth, the only change being a slight modification of the illumination. In the first instance there is no question about the imperfect adaptation of amalgam to tooth; in the second it appears reasonably perfect. The differences are even more striking when using the binocular microscope.

Micrometer microscopes are often used in comparing and calibrating line (length) standards. These, when arranged for the best possible accuracy, *i.e.*, best illumination and most suitable lines on a properly surfaced background, will give results agreeing within one micron. If, however, only a single microscope is used and the displacement measured in terms of the run of a screw, settings having been made with the assistance of a microscope, then it is necessary to add to the uncertainties of the microscope setting the errors and irregularities of the screw. A third source of error lies in the necessity of using an auxiliary contact to transmit any motion of the amalgam, since the new amalgam surface is constantly changing its character and, necessarily also, the character or appearance of any line or mark which may have been placed thereon.

The combined errors make it difficult, if not impossible, to detect variations of one or two microns, and again the slight contractions of samples in Wedelstaedt tubes may pass unnoticed.

Optical lever devices read by the mirror and scale method are only slightly if any better. Their use necessitates a multiplicity of contacts and bearing surfaces, each of which is subject to its own peculiar action; and each introduces its inherent source of error.

The safer way to proceed in using any of the above instruments is to use samples of amalgam of larger dimensions, thus magnifying the effect and consequently increasing the accuracy of values.

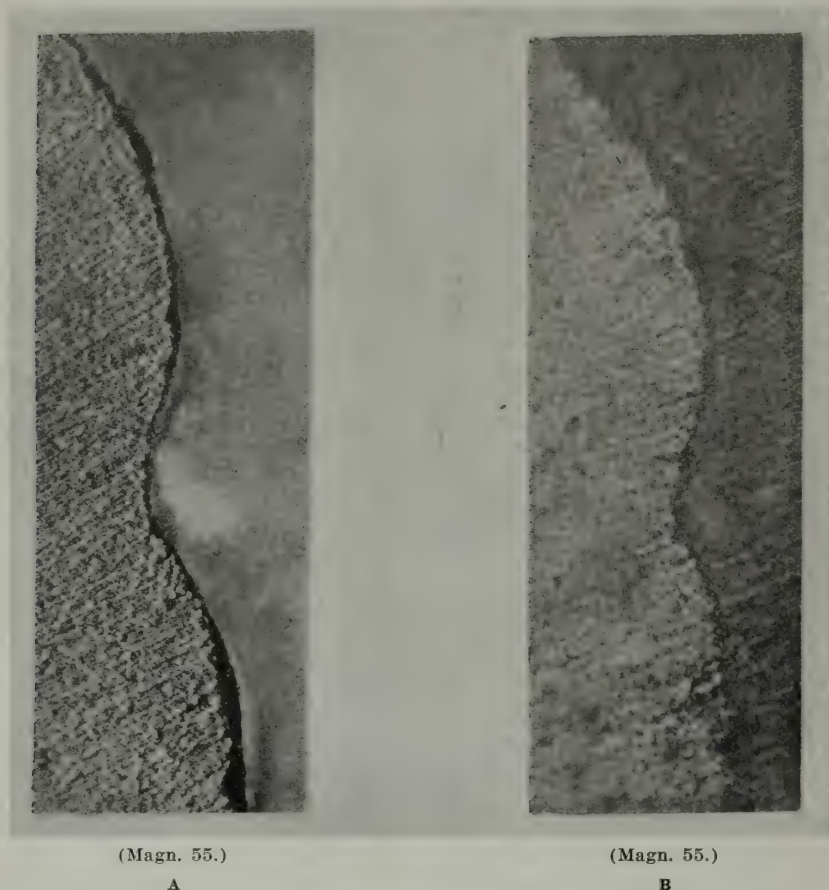
Probably the best instrument for rough measurements is an ordinary small screw machinist-micrometer adjusted for a specimen about 50 mm. long. This instrument is reliable to better than  $\frac{1}{200}$  mm. ( $\frac{1}{5000}$  inch), about two so-

for ditches or bulges and depend entirely upon the magnification of margins.

### III. Manipulation of Alloy.

This subject is often lost sight of in the discussion of physical properties.

Fig. 1.



Amalgam-enamel margin. Same margin viewed by different illuminations. Wrong interpretations often result from an improper use of the microscope.—*Photographs by R. E. Lofton.*

called Black points; but the specimen being about six times as long as the Wedelstaedt specimen there results a net increase in theoretical accuracy. Such an outfit properly handled in a thermostated chamber will be of more decisive value than many of the above-described instruments, which are used in looking

Probably no other phase of the restoration is subject to greater carelessness. The dentist may spend unusual care in shaping the cavity after having removed a generous amount of good tooth structure to make sure the last traces of decay have been eliminated, and then proceed to make up the amalgam on the assump-



tion that the only requirement is to daub up the cavity. Or if the assistant is doing the amalgamation and begins too soon, she is instructed to keep working the mass until the cavity is ready. Another practice is to keep the mass plastic by the addition of slight amounts of mercury at intervals, thus making it possible to fill several cavities from the same mix. The serious effects of this over-trituration will be found in another section.

The amalgamation and condensation procedure throughout this research (unless otherwise specified) was according to manufacturers' instructions. In the absence of definite instructions the following technique was adopted and is not seriously different from the majority of manufacturers' instructions.

The alloy and mercury were weighed in an approximate ratio such that there would be a very slight excess of mercury on condensation. These were mixed (not ground) in a mortar for one minute. The amalgamated mass was then transferred to the hand and mulled for two minutes. Part of the excess mercury was removed through chamois cloth. The artificial or matrix cavities were holes in steel blocks drilled and polished. The amalgam was condensed in these, using three or four different-sized pluggers. Those specimens which failed to show perfect adaptation to the form were rejected. Sufficient alloy was used so that an excess of amalgam could be built up over the top of the cavity and on tapping lightly it was usually possible to cause additional mercury to rise from the cavity. This excess mercury and amalgam was later removed, and the specimen taken from the matrix. The condensation was usually completed in two or three minutes, depending upon the size and shape of specimen.

The slight excess of mercury used appeared to give the condensed amalgam a greater uniformity and prevent the formation of layers when added quantities of amalgam were condensed in the cavity. These layers are fostered by delay in condensing, hence the desirability

of condensing the amalgam immediately after mixing it.

The greatest variation in results, when using a given manipulation, appears to arise not so much from slight irregularities in manipulation of alloy as from variation in alloy from package to package. All values reported for alloy G\* are for the same package; this is also true for alloy I. A fair degree of agreement will be found for check tests on these alloys recorded in Table 3. Another method of securing uniformity of results resorted to by some investigators consists in packing specimens under continued mechanical pressure, allowing several minutes to elapse before removing them from the matrix. The authors have been more interested in finding what happens to amalgams as they are ordinarily used, or should be used, and have made an attempt to begin the tests early enough to discover all changes accompanying the reaction, regardless of variations.

#### IV. Dimensional Changes with Temperature.

##### 1. APPARATUS AND METHODS.

For the measurement of the thermal expansion of small samples, methods and apparatus which make use of the interference of light waves have been employed at the Bureau of Standards for several years. For some of this work, the old-established Fizeau<sup>1</sup> method was used. Fig. 3 shows an interferometer devised by Priest<sup>2</sup> for determining the thermal expansion of single small pins. With another form of apparatus, recently described by one of the authors<sup>3</sup>, the expansion of three different pins can be simultaneously determined. These interferometers have been thoroughly tried out and found to measure small displacements with an error of about .005 microns or .0000002 inch. Because

\* Letters have been assigned to the trade names of the alloys and throughout this paper the same letter refers to the same alloy, but not necessarily to the same package of alloy except in the cases mentioned above.



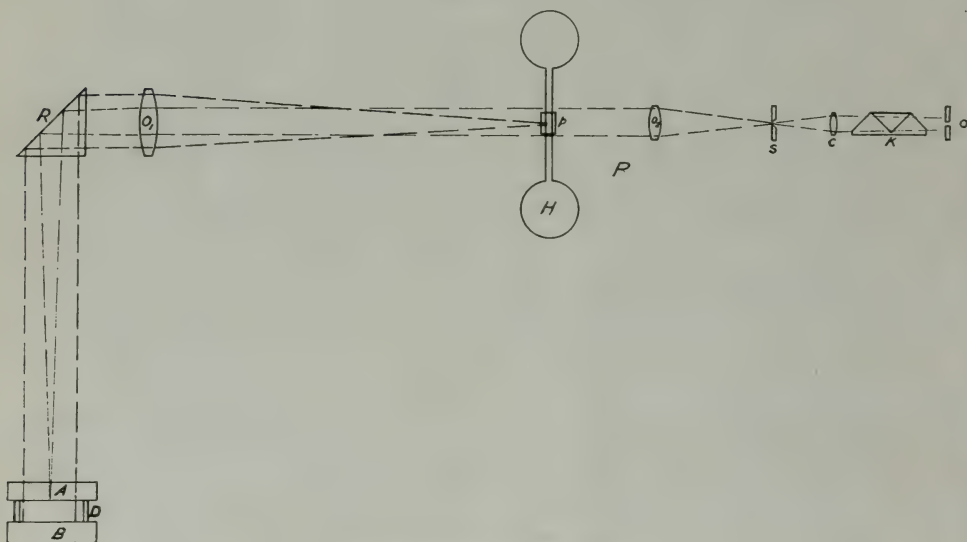
of the extreme accuracy and directness of the method and the necessity of using small samples, the interferometer was used for the determinations of thermal expansion of teeth and dental materials. A rather complete description of the apparatus has been given here for those who may be interested in making measurements of this kind.

The interferometer is usually thought of as an extremely complicated apparatus while in reality the essential parts are

ference pattern and the reference marks on the plates is formed by the lens  $O_2$  upon the slit  $S$  and viewed with the eyepiece  $C$ . The direct vision prism  $K$  separates the fringe patterns due to the helium light of different wave lengths.

A more detailed view of the interferometer is shown in Fig. 3. The upper surface of the base plate  $B$  is a polished true plane. One side of the plate which projects about .3 mm. above the upper surface of  $B$  forms a knife-edge  $SS$  par-

FIG. 2.



Vertical section of apparatus.

two plane glass plates which are held apart by a suitable separator. Fig. 2 shows a vertical section of the apparatus.

The two plates  $A$  and  $B$  and the ring  $D$  constitute the interferometer, while  $P$  represents a Pulfrich apparatus for viewing the fringes.

The light from a helium lamp  $H$  is focused upon a small total reflection prism  $p$ . After being collimated by the lens  $O_1$ , it is reflected by the prism  $R$  down to the interferometer plates  $A$  and  $B$ , which are in the focal plane of  $O_1$ . The rays returning from points in the plane of the mirrors are collimated by the lens  $O_1$ , and an image of the inter-

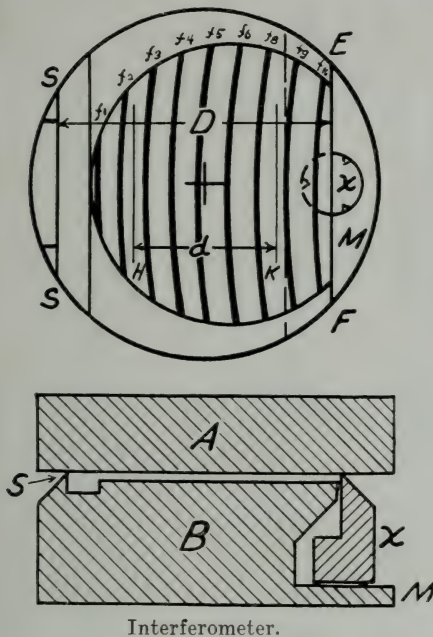
ference pattern and the reference marks on the plates is formed by the lens  $O_2$  upon the slit  $S$  and viewed with the eyepiece  $C$ . The direct vision prism  $K$  separates the fringe patterns due to the helium light of different wave lengths.

The upper end of the sample is cut away to the center from one side and beveled to an edge from the other. The flat surface of the sample is placed in contact with the edge  $EF$ , thus assuring a constant distance  $D$  between the sample and the knife-edge  $SS$ . Two reference lines  $H$  and  $K$ , distance  $d$  apart, are ruled parallel to the knife-edge  $SS$  on the upper surface of the base plate.

The upper interferometer mirror  $A$ , which is a plate of glass with both faces

polished true plane, rests on the knife edge SS and the top of the sample  $x$  adjusted to be slightly higher than SS. A narrow wedge-shaped space is thus formed between the two plates the widest part of which is toward  $x$ . Considering the two faces of this wedge, light from the lamp H made parallel by the lens  $O_1$  (Fig. 2) falling upon the lower surface of A (Fig. 3) is in part reflected and the rest transmitted to the

FIG. 3.



along  $f_3$  this distance is two wave lengths greater than at  $f_1$ , etc. Starting from  $f_1$  each successive band denotes that the separation of the two plates has increased by one-half the wave length of the light, or about  $\frac{1}{100,000}$  of an inch. Therefore the total number of bands between SS and  $x$  multiplied by one-half the wave length of the light used  $\left(\frac{\lambda}{2}\right)$  gives the difference in separation of the plates at  $x$  and SS, or the difference in elevation of  $x$  and SS above the upper surface of B. As it is difficult to determine the number of bands between  $x$  and SS, the number  $N$  between the two reference lines H and K is determined. The corresponding distances  $D$  and  $d$  are known, therefore the difference in elevation of  $x$  and SS above B at any time is equal to  $\frac{\lambda DN}{2d}$ .

Let  $Lx$  denote the length of the sample and  $Ls$  the length of standard material between SS and the plane of M. Let  $\Delta Lx$  and  $\Delta Ls$  represent the elongation of  $Lx$  and  $Ls$  caused by a rise of temperature  $\Delta T$ . If  $Lx$  and  $Ls$  expand differently the relative elevations of  $x$  and SS change, causing a change in the number of bands between H and K. Let  $N_1$  represent the number of bands between the reference marks before, and  $N_2$  the number after; the temperature change takes place; then,

$$\Delta Lx = \Delta Ls + \frac{\lambda D}{2d} (N_2 - N_1) \quad (1)$$

That is, the elongation of  $x$  is equal to the elongation of  $s$  plus the difference in elongation of the two, which is determined from the change in the number of bands between the reference marks.

The coefficient of linear thermal expansion is the elongation of unit length per degree rise of temperature

$$C = \frac{\Delta L}{L \Delta T} \quad (2)$$

The coefficient of expansion of  $x$  is then given by the expression

$$Cx = \frac{\Delta Lx}{Lx \Delta T} = \frac{\Delta Ls}{Lx \Delta T} + \frac{\lambda D (N_2 - N_1)}{2d Lx \Delta T} \quad (3)$$

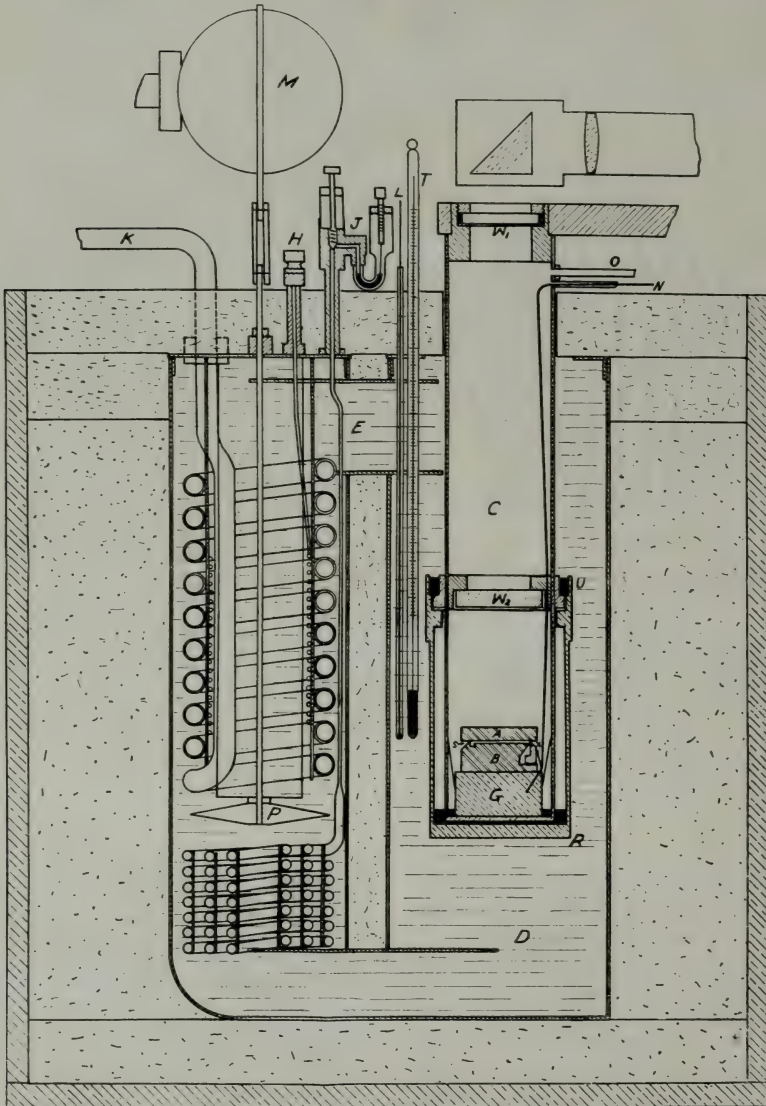
upper surface of B. Here again part of the light is reflected. Between these two reflected wave trains "interference" takes place. The observer, catching this reflected light, sees straight dark bands parallel to each other across the face of the wedge. In Fig. 3,  $f_1, f_2, f_3$ , etc. represent these bands. The band  $f_1$  shows that along that line the distance down and back between the plates is some whole number of wave lengths. On moving to a wider part of the wedge another line  $f_2$  is reached where twice the distance between the plates is one wave length greater than at  $f_1$ . Similarly

Since  $L_x$  and  $L_s$  are practically equal this becomes

$$C_x = C_s + \frac{\lambda d(N_2 - N_1)}{2dL_x \Delta T} \quad (4)$$

on a steel block  $G$  in the bottom of the container  $C$  (Fig. 4), which consisted of a steel tube, 30 cm. long, 5 cm. in diameter and 1 mm. thickness of wall.

FIG. 4.



Temperature control apparatus.

where  $C_s$  is the coefficient of expansion of the base plate material.

In order to control the temperature properly the interferometer was mounted

the upper end of which was closed with glass window  $W_1$ ; 10 cm. from the base another glass window  $W_2$  was supported by a heavy brass ring. Most of the



lower part of the tube was cut away to allow easy adjustment of the interferometer. This end of the tube was closed with a steel cup R, which screwed onto the tube at U with a rubber gasket to make the joint tight. A little mercury in the bottom of the cup made good metallic contact between the base block and the bath. The container was lowered with a rack and pinion into the oil bath which regulated the temperature. The bath liquid was circulated through the tubes D and E by the propeller P. To eliminate vibration the motor M was supported on a separate base and connected to the propeller shaft by a small rubber tube. The liquid was cooled by the brine coil K and heated with a 10-ohm resistance coil H the current in which was regulated by a relay operated by the thermostat J. This apparatus was thermally insulated with ground cork and mounted in a wooden box.

The temperature of the liquid around C could be held for any length of time within  $.01^\circ$  of the desired value. The temperature of the bath was read with a thermometer T and a 5-junction thermocouple L, and the temperature of the base block and sample with another 5-junction thermocouple N. A temperature survey was made of this apparatus with differential thermocouples to determine both the time required for the interferometer and sample to reach a steady state when the temperature of the bath was held constant, and the lag of the sample when the bath temperature was changing.

## 2. EXPERIMENTAL PROCEDURE.

The amalgam material after being prepared in the manner already described was made into samples about 6 mm. in diameter and 1 cm. long, illustrated by x (Fig. 3). These samples were kept for several weeks before measurements were made. The porcelain samples were made in the same form and kept under water. The tooth specimens were taken from different teeth and different parts of the same tooth. One of the samples, the expansion of

which is shown in Fig. 5 was taken from the crown of a large molar, the other from the root of a long cuspid tooth.

After the sample was properly adjusted the interferometer was placed in the container and lowered into the bath. Two procedures were followed in making the measurements. The first was to hold the temperature of sample constant for at least one hour at each point before the measurements were made. The second was to change the temperature of the sample slowly, about  $1^\circ\text{C.}$  in 3 or 4 minutes, and make observations periodically.

With the samples from teeth it was found that as soon as they were heated, moisture evaporated and a very rapid contraction took place amounting to 0.2 to 0.3 mm. for a 1 cm. sample. These samples regained their original length if allowed to stand in water for two or three days. To overcome this contraction, which was many times greater than the thermal expansion of the material, the interferometer and sample were placed in a container filled with water. This container was then placed in the temperature control apparatus. With both the porcelain and teeth it was found necessary to keep the samples under water and make the measurement with the samples under water in order to obtain consistent results. This procedure seems to reproduce actual condition of the mouth and yield values of thermal expansion as near correct as it is possible to obtain with this type of material.

## 3. RESULTS.

The following curves represent the elongation of the different materials with change of temperature. Degrees centigrade are plotted as abscissæ, and change in length ( $\Delta L$ ) in microns ( $\mu$ ), of a sample 1 cm. long as ordinates. All the observations that were taken have been plotted; none were rejected or omitted.

Curve I, Fig. 5, is for a sample cut from the crown of a molar, curve II for

FIG. 5.

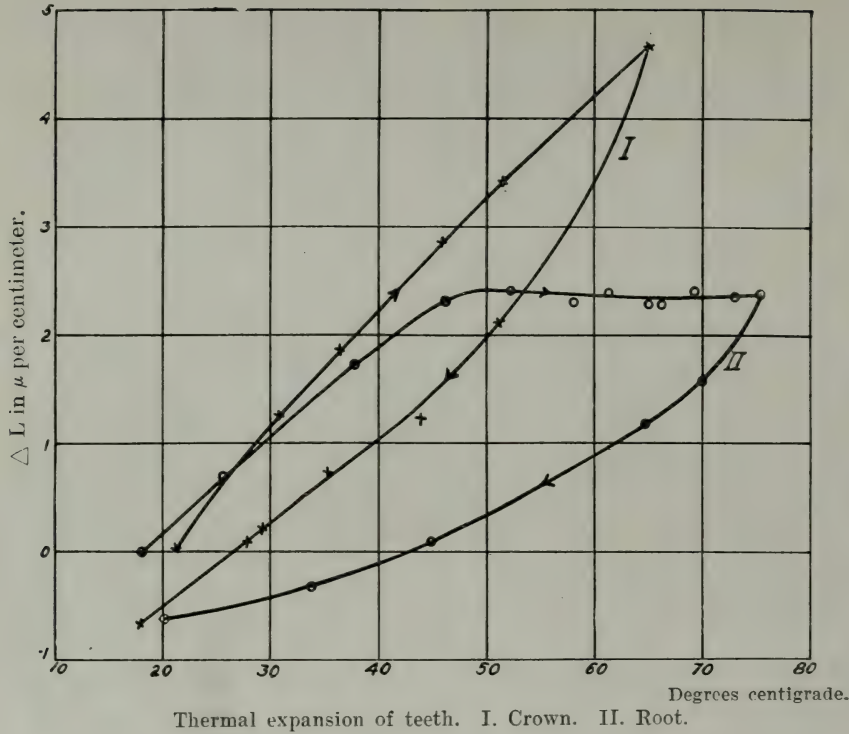


FIG. 6.

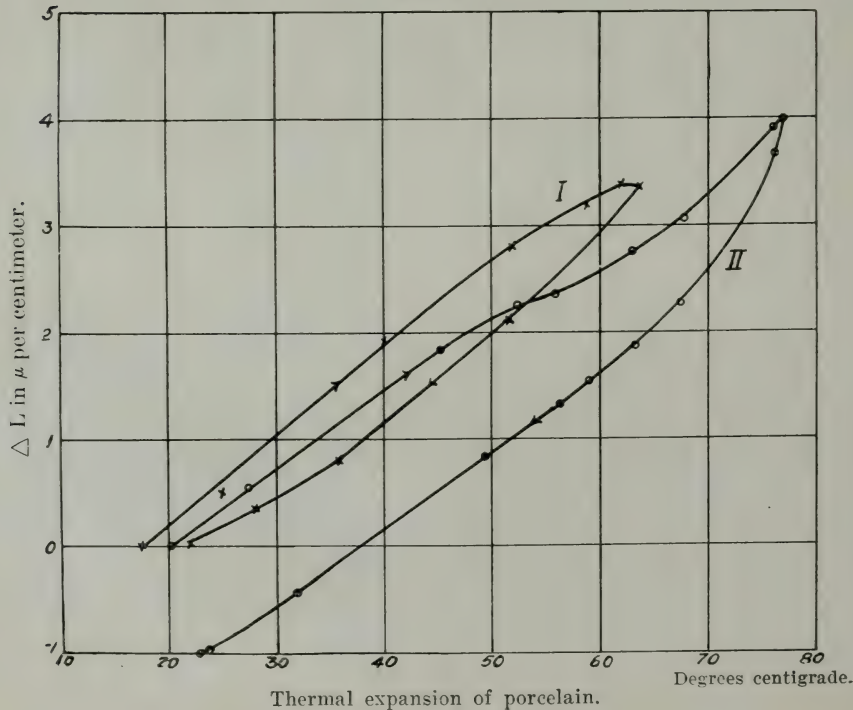


FIG. 7.

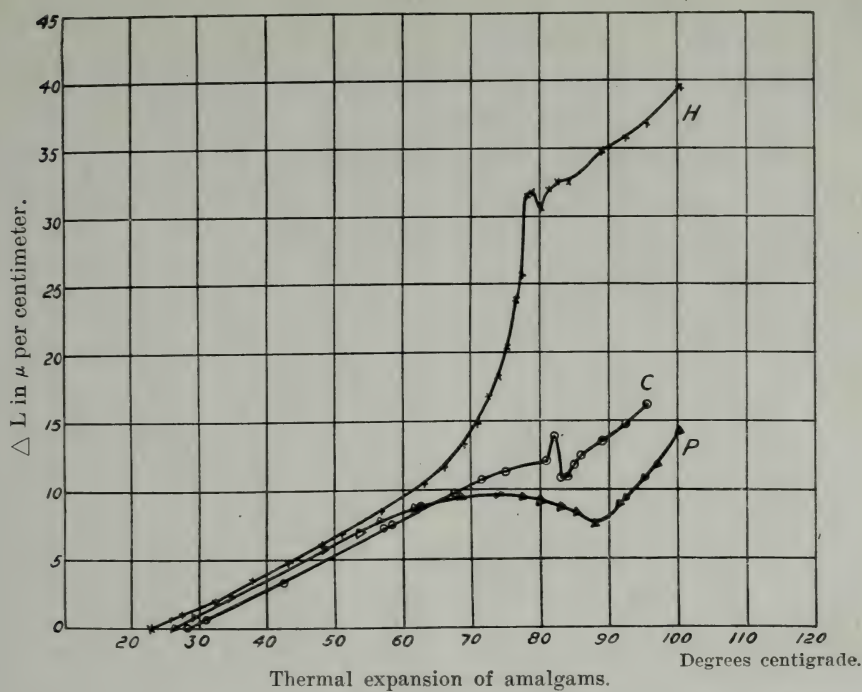
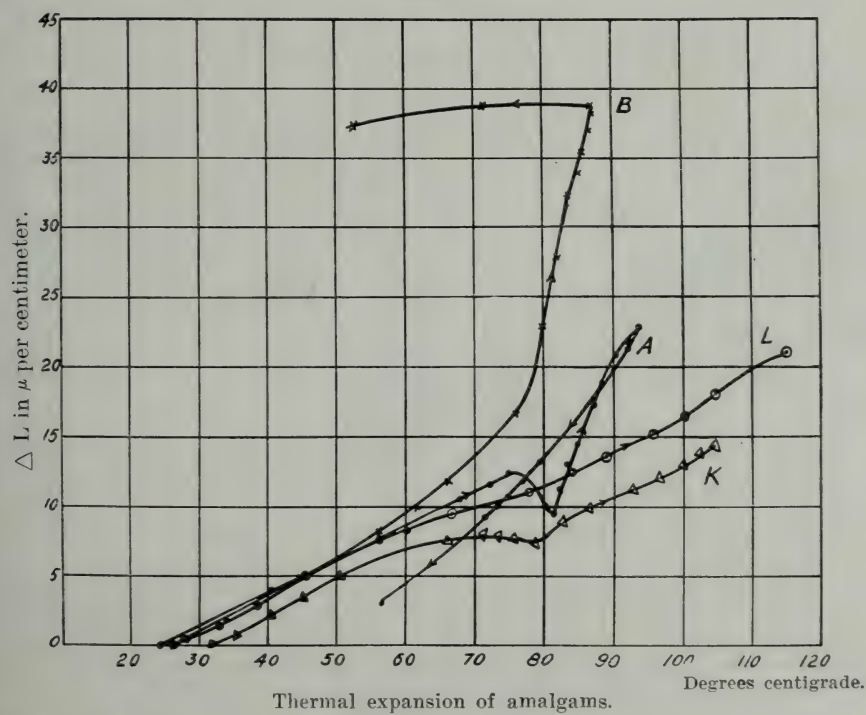


FIG. 8.





a sample from the root of a newly extracted cuspid tooth.

Curves I and II, Fig. 6, represent the expansions of two different samples of porcelain.

The curves in Figs. 7 and 8 are for different kinds of amalgams. These curves are lettered to correspond with the kind of material from which the samples were made. In fact, most of the samples had previously been used for experiments of setting changes.

Most of the samples showed irregular behavior near 80°C. Some of the samples when removed from the container were covered with soft drops of mercury which formed into bright crystals in a short time. An inspection of these curves and the samples showed that the amalgams must have undergone some radical transformations when heated. It is very probable that any filling or part of a filling, if by chance subjected to temperatures near this value, may suffer serious injury or have its physical properties entirely changed.

In Table I there are tabulated data on the linear thermal expansion of a num-

ber of materials including sections of teeth. From this Table it is seen that the expansions of teeth range from 6.4 to 11.4, depending upon the tooth selected and the portion of the tooth used, an average value of approximately 8. The porcelain average value is not far from the above figure, gold is somewhat higher (14.4), while the amalgams average about 25.

Since the effects due to the differential expansions of these materials depend upon the temperature range, size of cavity, and elasticity of tooth-substance and material, no general statement should be made regarding the relative merits of materials unless all the important conditions are given due consideration.

To illustrate, let us consider the case of a maximum cavity and filling 1 cm. in diameter, undergoing a temperature variation of 50° centigrade. Then the free expansion along each co-ordinate axis is 4 microns for the cavity, 7 microns for the gold filling, and 12.5 microns for the amalgam. (If the dimension or temperature range is less,

TABLE I. AVERAGE EXPANSION COEFFICIENTS.  
(Range 20 to 50°C.)

Material.	Expansion Coeff. x 10 <sup>6</sup> .	Material.	Expansion Coeff. x 10 <sup>6</sup> .
Tooth (root) . . . . .	8.3	Amalgam (C) . . . . .	25.0
“ (across crown) . . . . .	11.4	“ “ . . . . .	24.7
“ (root and crown) . . . . .	6.4	“ “ . . . . .	28.0
“ “ . . . . .	8.7	Porcelain (Bayeux) . . . . .	4.1
“ “ . . . . .	8.3	Gold . . . . .	14.4
Synthetic Porcelain . . . . .	7.1	Platinum . . . . .	9.0
“ “ . . . . .	8.1	Silver . . . . .	19.2
“ “ . . . . .	7.5	Mercury (linear) . . . . .	60.6
Amalgam (H) . . . . .	26.4	Zinc . . . . .	29.2
“ (C) . . . . .	25.0	Tin . . . . .	22.3
“ (K) . . . . .	22.1	Copper . . . . .	16.8
“ (P) . . . . .	24.5	Gutta-percha . . . . .	198.3
“ (A) . . . . .	25.4	Aluminum . . . . .	23.1
“ (B) . . . . .	28.0	Steel . . . . .	11.0
“ (L) . . . . .	24.8		

NOTE: The above expansions are tabulated as amount of expansion, in microns, for a specimen one meter in length when heated one degree C. For example: Amalgam C will change 25 microns per meter per degree; or, in terms of a specimen one centimeter long (the approximate diameter of a molar) the expansion is 0.25 micron per degree = 2.5 microns per ten degree range = 12.5 microns per fifty degree range, etc.

these effects will be proportionately reduced.) If we have perfect adaptation and no stress at the lower temperature, then at the higher temperature there are two extreme possibilities: (a) the elasticity of the tooth and compressibility of the material may be such that perfect adaptation is maintained, or (b) the rigidity of the tooth and plasticity of the material may be such that there will be a flow of material in the only free direction, causing a spheroiding or bulging over the cavity. With a perfectly rigid tooth cavity, this may equal three times the linear differential expansion of the substances, which will be 25 microns in the case of amalgam. Should the filling material take a permanent set at the higher temperature, then on returning to the lower temperature, all materials having undergone free contraction, there is a possibility of a four-micron separation around the filling. This is analogous to the case of heating the Wedelstaedt tube referred to in a previous section.

The above temperature range of 50° C. has been decided upon as a fair representation of the temperature variation to which metallic fillings may be subjected. In order to test this experimentally copper-constantan thermocouples were cemented into amalgam inserts one to three millimeters from the surface, and the temperatures of the inserts were read by means of a potentiometer when different foods and drinks were taken into the mouth. With ice water and cracked ice temperatures as low as 5°C., and with hot foods and drinks temperature from 50° to 60°C. were observed in the inserts. No unusual or excessive sensation of pain was indicated by the adjacent vital teeth during the experiments.

## V. Dimensional Changes with Time.

### 1. APPARATUS.

The apparatus described in the previous section was used to measure the dimensional changes of newly made amalgam samples during the hardening or setting period. The temperature of

the sample and interferometer was held constant and the variations in the length of the specimens with time were recorded. These dimensional variations during hardening will be referred to as setting changes.

In Equation (1),  $\Delta L_s$  represents the change in the length of the material under the knife-edge due to the change in temperature. In the present case the temperature was constant, therefore  $\Delta L_s$  equals zero and the expression for the setting change of the sample becomes

$$\Delta L_x = \frac{\lambda D}{2d} (N_2 - N_1) \quad (5)$$

Here the interferometer becomes a lever of the second class with the knife-edge forming the fulcrum, the top of the sample the point of application of the force, and the upper plate, which weighs about 10 grams, the load. This type of lever is far less susceptible to friction and contact error than those used in the moving dial or mirror instruments. The only restraining force on the sample is the constant 5-gram weight of the cover plate.

The results obtained from several samples made from the same material and held constant at temperatures ranging from 8° to 37°C showed that careful temperature control was not of sufficient importance to warrant the use of the constant temperature apparatus.

Four interferometers of different construction were mounted in a semi-circle on a table so that the Pulfrich apparatus could be turned from one to another for making observations on the interference fringes. A thermometer was placed close to the interferometers and the temperature of the room was recorded after each observation on the fringes. This arrangement greatly facilitated the work, for four samples were investigated simultaneously, whereas the constant temperature apparatus accommodated only one at a time.

### 2. EXPERIMENTAL PROCEDURE.

The alloys were amalgamated and condensed into the mold according to the



procedure previously described. The specimens were immediately removed from the mold and adjusted to fit the interferometer, which required from 4 to 8 minutes. The cover plate was pressed down upon the sample with a force of several pounds to insure good contact at the bearing points and to ascertain whether or not the sample had hardened enough to support the weight of the plate. Most of the samples hardened in a few minutes, but a few like M and N, Fig. 14, were still quite soft after 60 minutes. The time record started the moment the sample was removed from the mold and observations of the length changes, which commenced immediately after the adjustment of the samples, were taken at given intervals over a period of one to several days. With rapidly changing materials of this kind the number of interference bands between the reference lines was estimated to the nearest 0.1 of a band. Since 0.2 of a band is equivalent to about  $0.05\mu$ , this estimation gave all the accuracy necessary.

At least three samples from each material were investigated according to the above procedure.

### 3. RESULTS.

The following curves represent length changes which took place during setting. Time in minutes is plotted as abscissæ and change of length ( $\Delta L$ ) in microns ( $\mu$ ) of a sample 1 cm. long as ordinates. An ascending curve represents an elongation and a descending curve a contraction. The time required to adjust the sample to the interferometer is plotted along the zero ordinate. The mean temperature and maximum variation in temperature of each sample has been recorded with the curve.

In Fig. 9 are represented the setting changes of four samples from material C. The samples were all prepared according to our regular procedure but were held at different temperatures after being placed in the interferometer. The temperatures at which the different samples were held during the runs are

as follows: Sample C-1 at  $37^{\circ}\text{C}$ ., C-2 at  $27.8^{\circ}\text{C}$ ., C-3 at  $20.4^{\circ}$  and C-4 at  $8^{\circ}\text{C}$ .

Fig. 10 represents the data taken on four samples of material B. The samples were prepared according to our regular manipulation and held very near to the same temperature throughout the experiments. The mean temperature of the sample and the maximum variation during the run are recorded with each curve. Figs. 11 to 13 represent the results obtained from samples of alloys C, H and A, which had been given various treatments before and subjected to similar conditions after condensation. The mulling time was varied from 1 to 35 minutes, a specimen of each alloy was cooked for 3 hours at  $120^{\circ}\text{C}$ ., and  $1\frac{3}{4}$  per cent. zinc was added to one alloy.

From the foregoing curves it is seen that the length of time devoted to mulling the amalgam exerted by far the greatest effect upon its subsequent behavior. The curves from samples of material B, Fig. 10, which received practically the same treatment, while quite concordant, do not show a much better agreement than those of material C, Fig. 9, which were held at different temperatures during the setting period. In Figs. 11, 12, and 13, curve 1 represents the usual manipulation, curve 2, in which alloys were cooked for 3 hours at  $120^{\circ}\text{C}$ ., differs very little from curve 1. C-3 and H-3 which were mulled only one minute agree almost as well with 1. The addition of  $1\frac{3}{4}$  per cent. zinc to alloy A seems to have changed the character of the setting curve A-3. The marked effect caused by mulling the amalgams 20 to 35 minutes is shown by curve 4. Experiments of this kind showed that large setting contractions could be produced in any of the amalgams by overmulling and emphasized the importance of that part of the process. Compared with this effect the slight irregularities due to variations in room temperature seem to be insignificant. If setting contractions of 10 to  $20\mu$  per centimeter are important then this question of mulling-time must be given careful consideration.

Our results upon effects of mulling



FIG. 9.

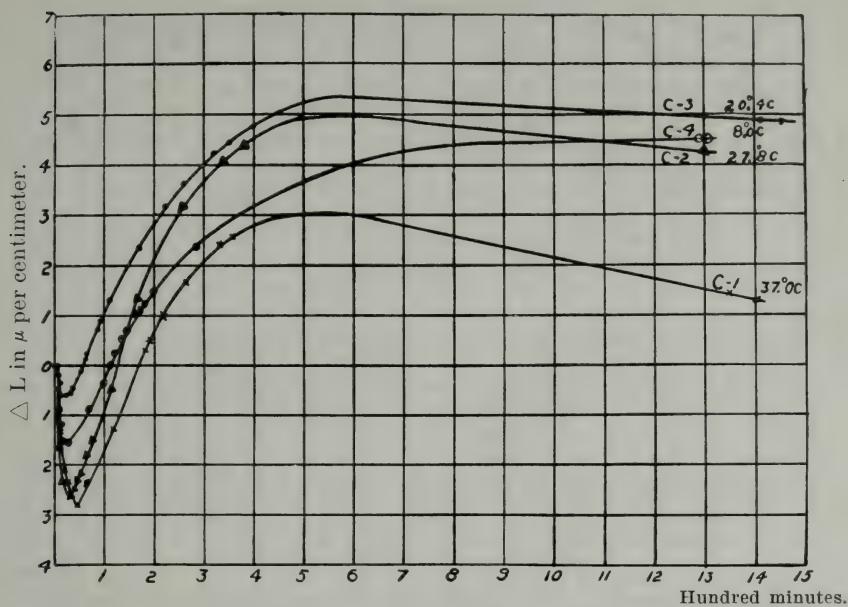


FIG. 10.

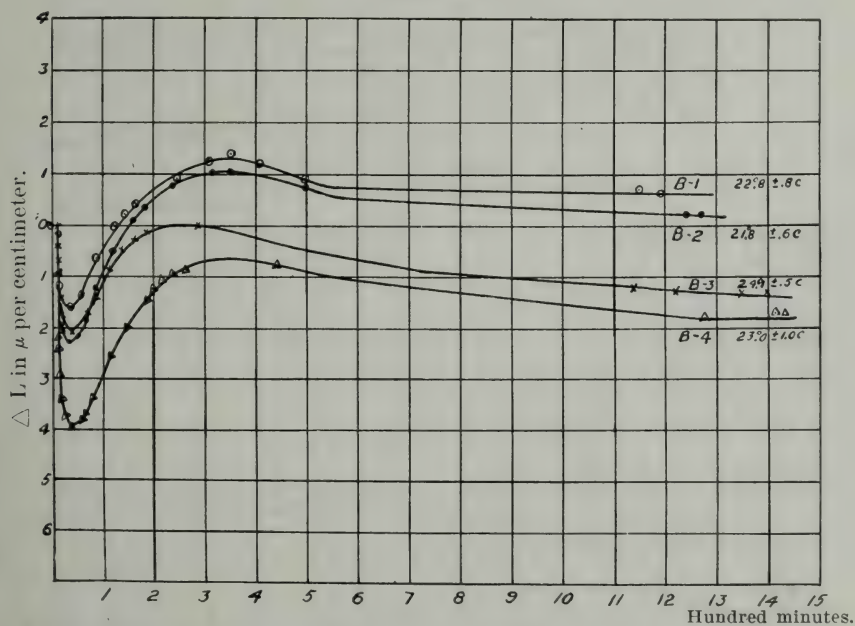


FIG. 11.

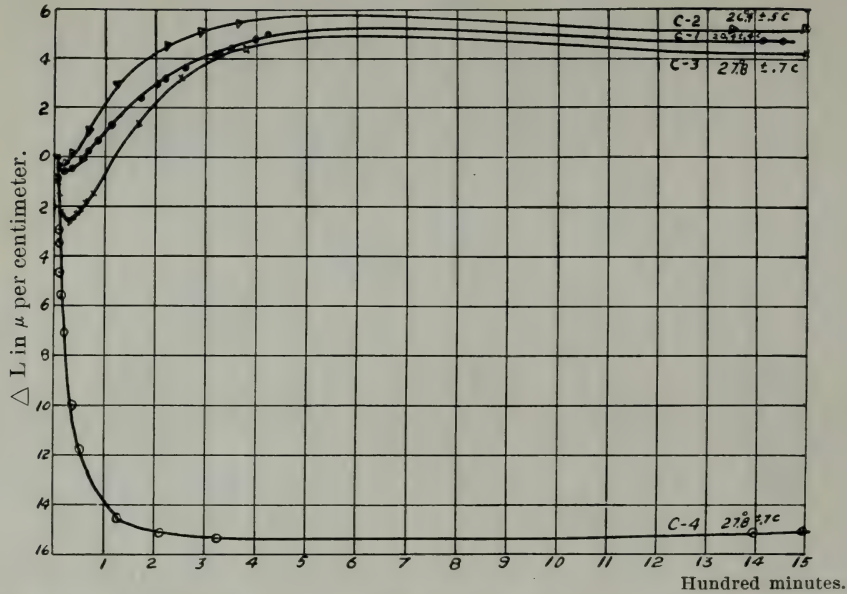
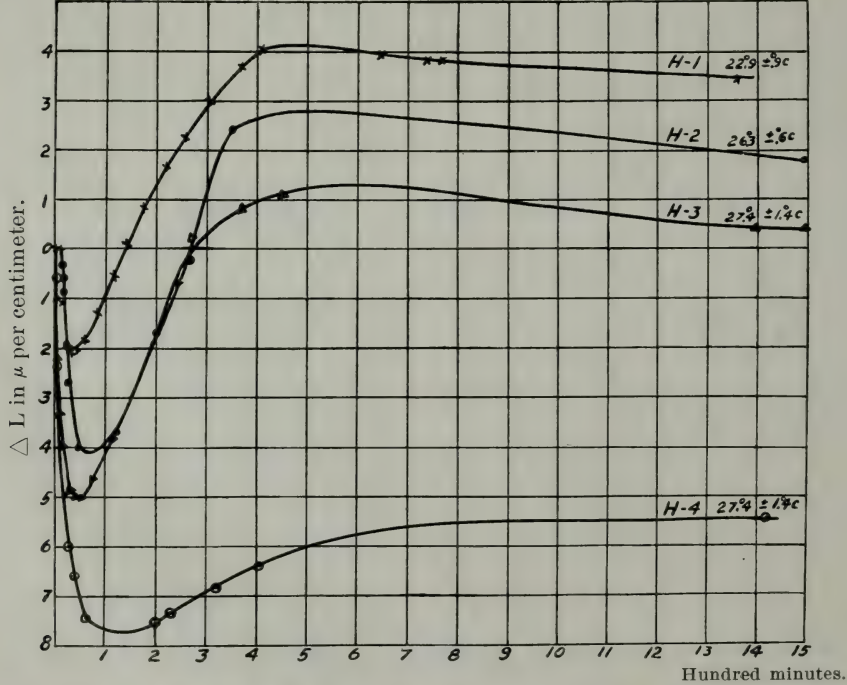


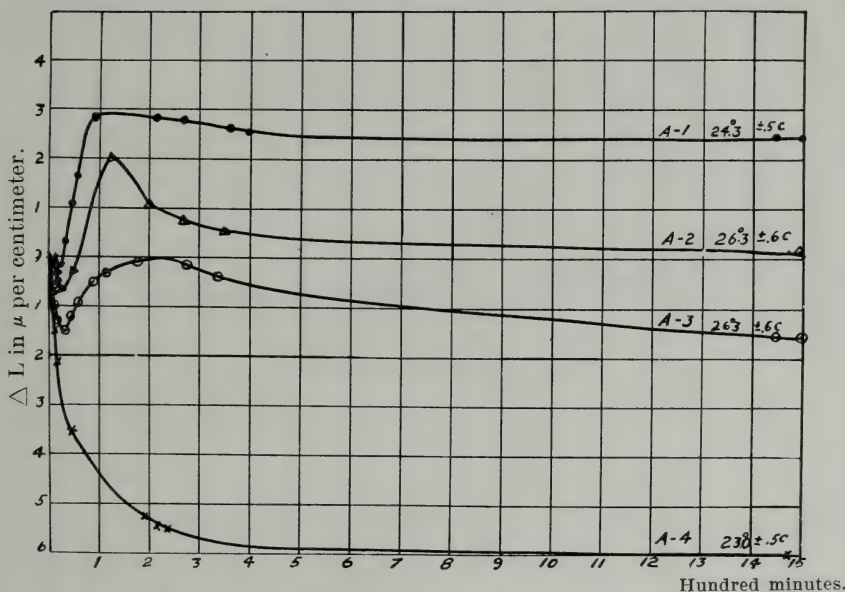
FIG. 12.



agree very well with the findings of Dr. Gray<sup>4</sup>. He has placed greater emphasis upon the importance of accurate temperature control of the samples during the setting period than we have. Regarding the effect of annealing, no comparison can be made because he has neglected to state the temperature at which the annealing was carried out.

during the first hour because the material would not support the lightest pressure. Alloy S contained 73 per cent. silver. Alloy P contained 5 per cent. zinc. Alloys E, I and F (Fig. 15) are not widely different in setting changes during the first hour, but diverge somewhat after this time. All show permanent shrinkage. Alloys B, G and J of

FIG. 13.



Setting changes of amalgam A. A-1. Usual manipulation. A-2. Alloy cooked 3 hours at 120°C. A-3. 1 3/4% zinc added to alloy. A-4. Mullied 20 minutes.

The setting changes of each of the other materials are shown in the following figures, 14 to 17. At least three samples from each material, prepared according to the regular procedure, were tested and gave concordant characteristic curves, similar to those shown for material C, Fig. 9.

Only one curve from each material has been plotted for the purpose of making a comparison of the behaviors of the different material.

From the chemical analysis (Table 3) it will be seen that M and N (Fig. 14) are low silver alloys. These specimens were very slow in setting, in fact it was impossible to make any measurements

Fig. 16 have practically the same silver analyses. Alloys K and L (Fig. 17) are lower in silver than E or F. The difference in behavior is probably due to relative percentages of two other elements.

Nearly all of the samples show an initial contraction. With some this continued and no recovery was evidenced, with others an initial contraction of from 1 to 3 microns took place in the first 30 or 40 minutes, after which the sample expanded for the next 400 minutes remaining quite constant during the remainder of the experiment. The initial contraction could be due to one or all of at least three causes. The sample is usually quite soft for a few



FIG. 14.

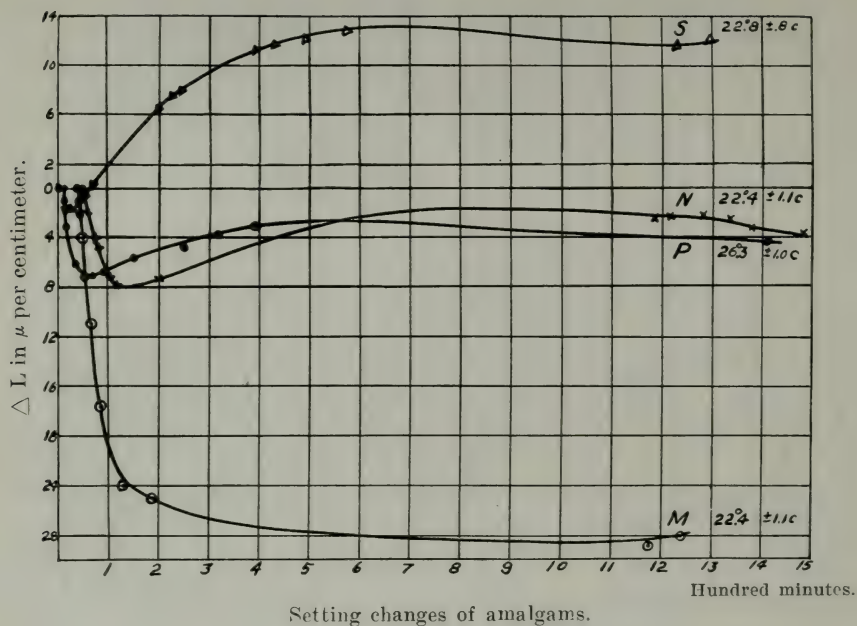


FIG. 15.

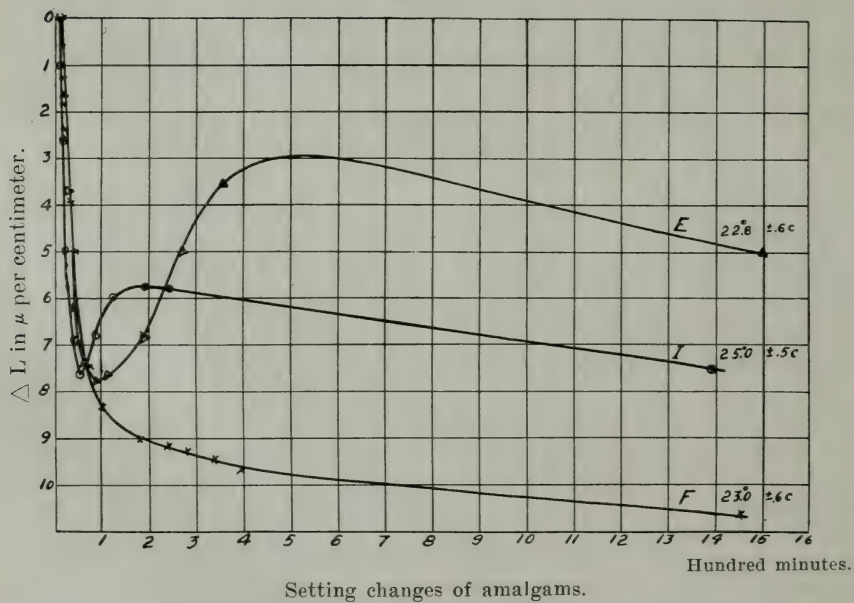


FIG. 16.

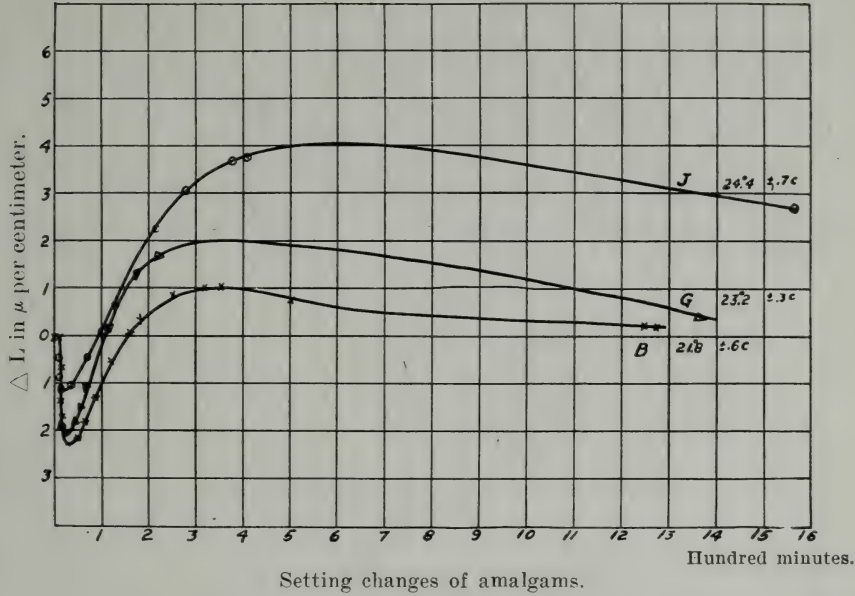
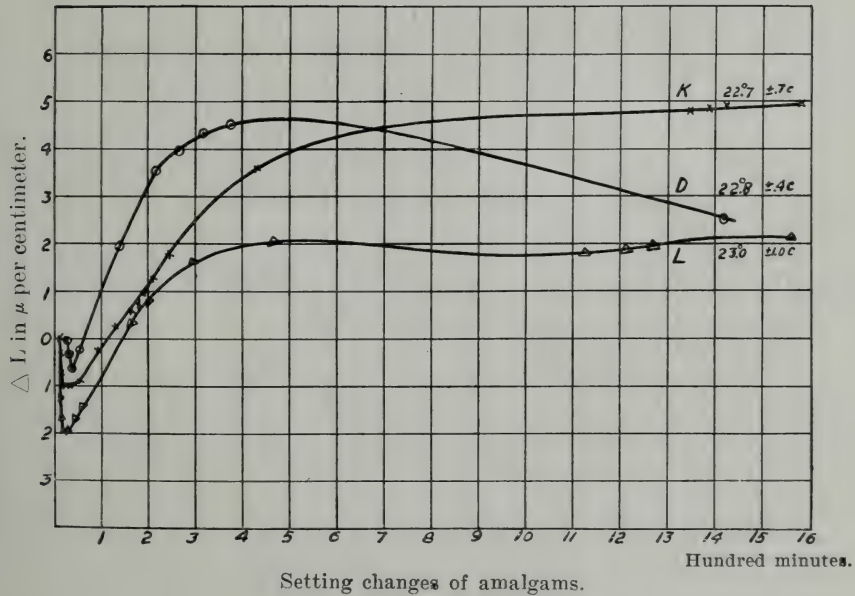


FIG. 17.



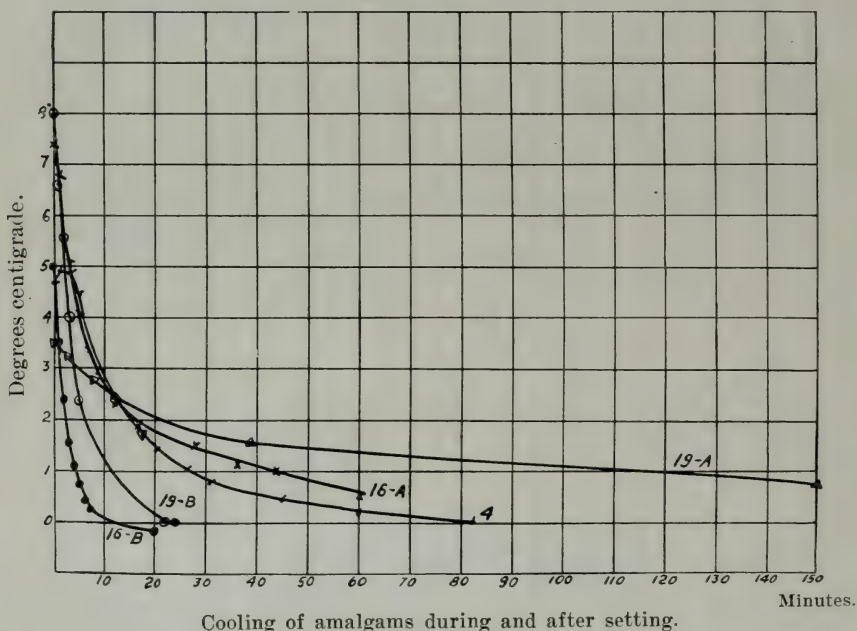
minutes, which might cause a settling of the sample under even its own weight; there might be a real contraction of the material; or in adjusting the sample it is heated somewhat in the hand which is slightly above the room temperature. In the last case a thermal contraction should take place during the first few minutes.

To follow the actual temperatures of the sample during the setting or hardening period, one junction of a differential

placed in the apparatus and was still  $0.7^{\circ}\text{C}.$  above the temperature of the block 150 minutes later. Three hours later it was warmed  $8^{\circ}\text{C}.$  above block temperature and allowed to cool. Curve 19-B shows that it returned to the block temperature after 22 minutes.

The second sample was  $7.4^{\circ}\text{C}.$  above block temperature immediately after being put into the apparatus. Its cooling is shown by curve 16-A. It was still  $0.5^{\circ}\text{C}.$  above block temperature 60

FIG. 18.



Cooling of amalgams during and after setting.

thermocouple was placed in a block which had the same temperature as the room. The other junction was packed in the centre of the sample which was made and adjusted according to the usual procedure.

Measurements made immediately after samples were placed in the interferometer showed that their temperatures were  $4^{\circ}$  to  $8^{\circ}\text{C}.$  above the temperature of the block which was very nearly  $22.5^{\circ}$  during these experiments. Fig. 18 shows the cooling curves of some of these samples. The sample 19-A was  $35^{\circ}\text{C}.$  above the temperature of the block when

minutes later. The following day its temperature was increased  $5.0^{\circ}\text{C}.$  It then cooled in twelve minutes as shown by curve 16-B.

Curve 4 shows another sample that required 80 minutes to return from  $5.0^{\circ}\text{C}.$  above to block temperature.

These experiments show that heat is evolved by the material during the amalgamation. This evolution of heat seems to continue during the period while the sample is undergoing most of its variation of length. Of course some of the original heating comes from the hand of the operator but curves 19-B and 16-B



FIG. 19.

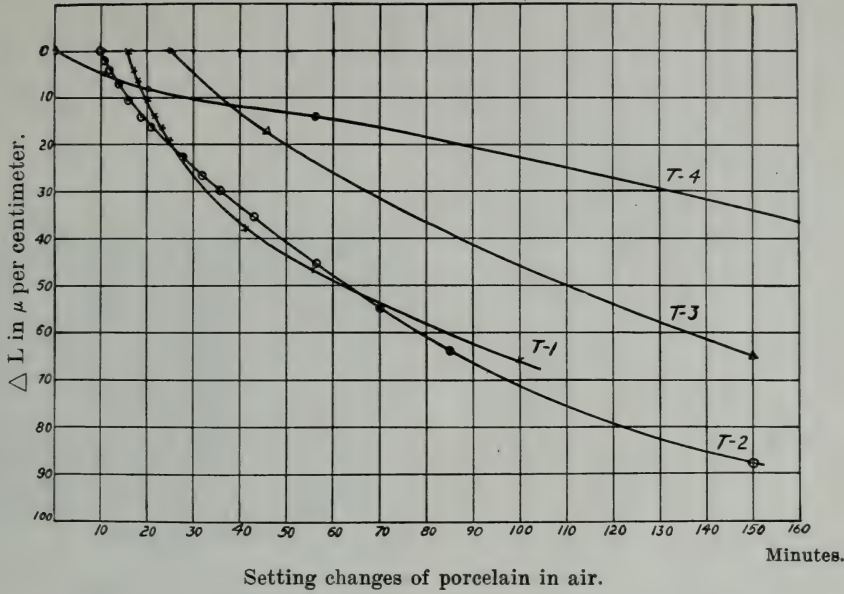
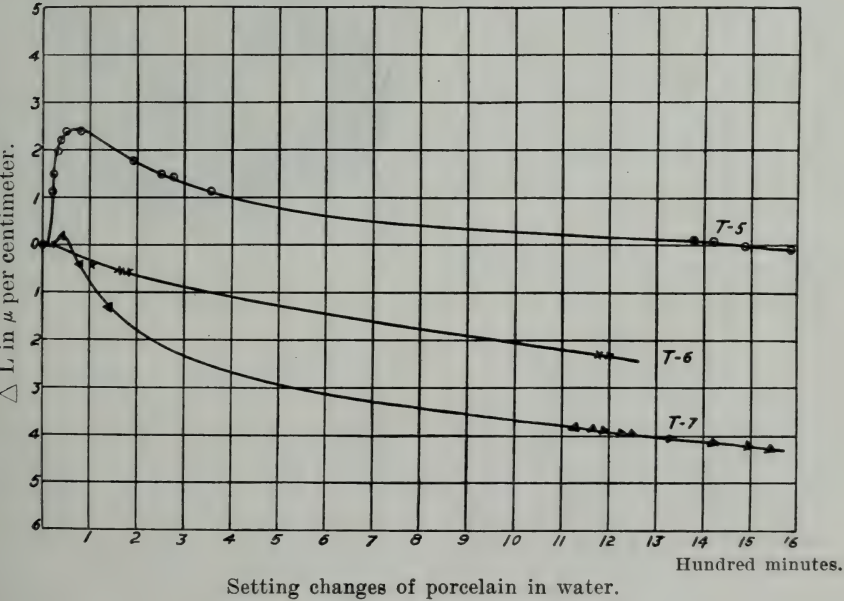


FIG. 20.



show that the sample should return to the temperature of the room in 15 to 20 minutes. Enough heat seems to be evolved to keep the temperature of the sample above that of the surroundings for several hours. From this it seems that careful control of the sample container does not insure that temperature of the sample is the same as that of its surroundings. Consideration of the foregoing results makes it possible to account for 1 to 2 microns of this initial setting contraction by the thermal contraction of the material. The fact that some of the samples, which hardened in a few minutes after condensing, contracted more than that amount, leads us to believe that part of the initial contraction was real.

The porcelain samples contracted rapidly when exposed to the air. This is shown by curve T-1 and T-2, Fig. 19. Sample T-3 retained its length for 25 minutes while under water and then contracted rapidly when exposed to the air. Curve T-4 represents the behavior of a sample coated with its varnish and exposed to the air.

The curves in Fig. 20 represent the behavior of samples of porcelain which were kept under water during the experiment. Sample T-5 was exposed to the air during adjustment and dried slightly. Upon being put into the water, it evidently absorbed some water and expanded 2.4 microns during the first few minutes; after that it contracted slowly.

The two samples T-6 and T-7 were kept moist while being adjusted to fit the apparatus and show a slow uniform contraction.

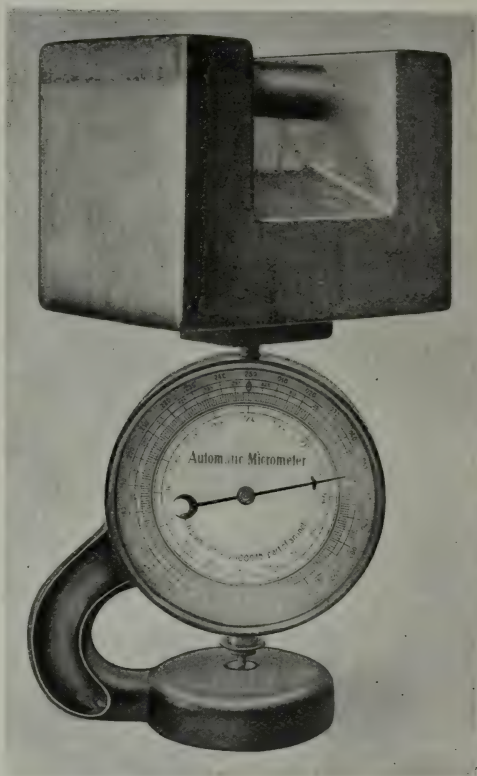
#### VI. Flow Under Compression.

The authors have found all amalgams yielding under constant pressure even months after amalgamation. Hence the questions of setting and crushing strength become relative factors. When the crushing load is applied as rapidly as possible the crushing strength always runs high.

Most amalgams, after setting for 48 hours, will show crushing strengths of

over 32,000 pounds per square inch if crushed quickly, say in 3 minutes; but by applying a constant pressure of 3200 pounds, only one-tenth the previous crushing load, we found it possible to crush some of these same amalgams within 20 hours.

FIG. 21.

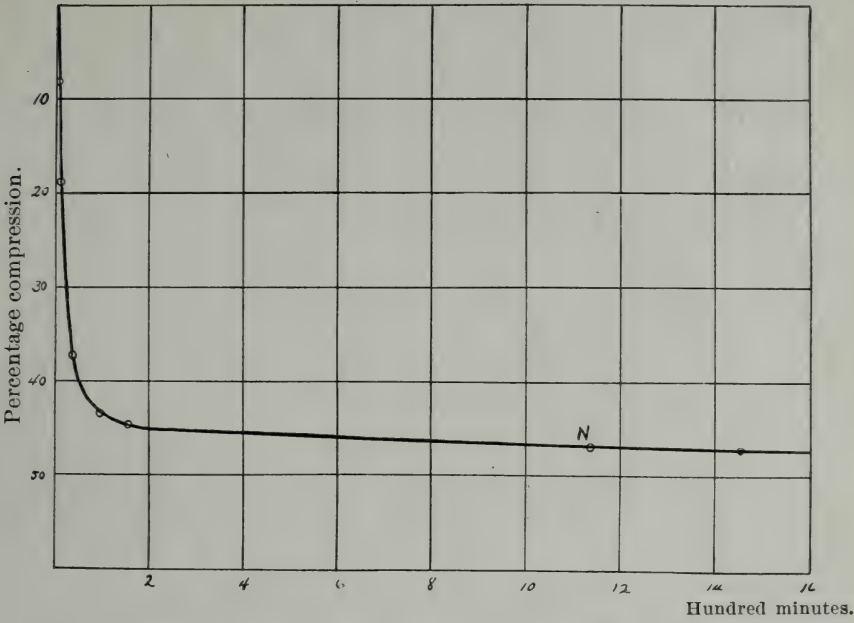


Micrometer adapted to measure flow of amalgam.

With these facts established it was decided to make comparative flow tests, beginning 2 hours after packing, and applying the approximate tenth load, namely, 3200 pounds per square inch. The load was applied to a specimen 4 mm. in diameter and about 8 mm. long.

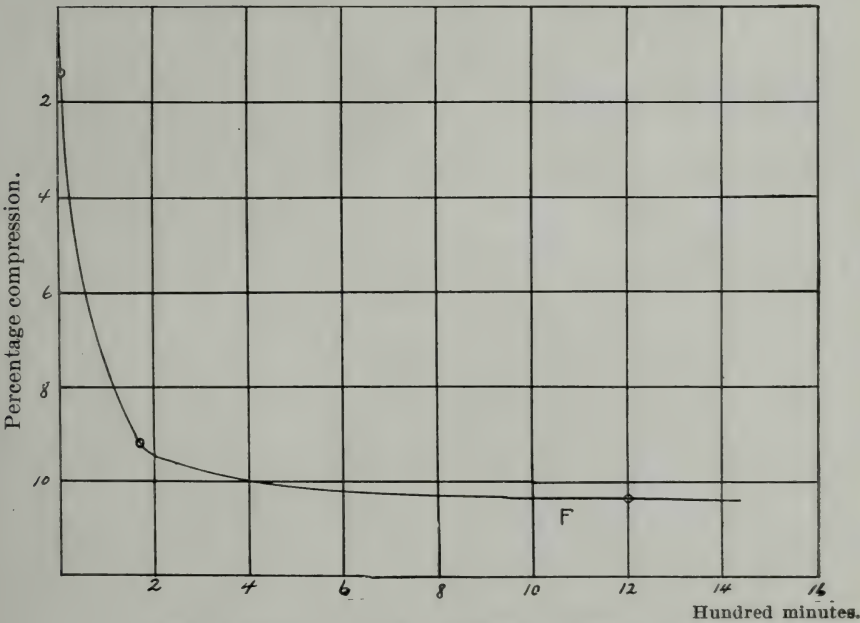
The apparatus used for the flow tests is shown in Fig. 21 and consists of a micrometer with a weight pan attached at the top of the upright rod or plunger.

FIG. 22.



Flow of amalgams; load applied 2 hours after packing.

FIG. 23.



Flow of amalgams; load applied 2 hours after packing.



FIG. 24.

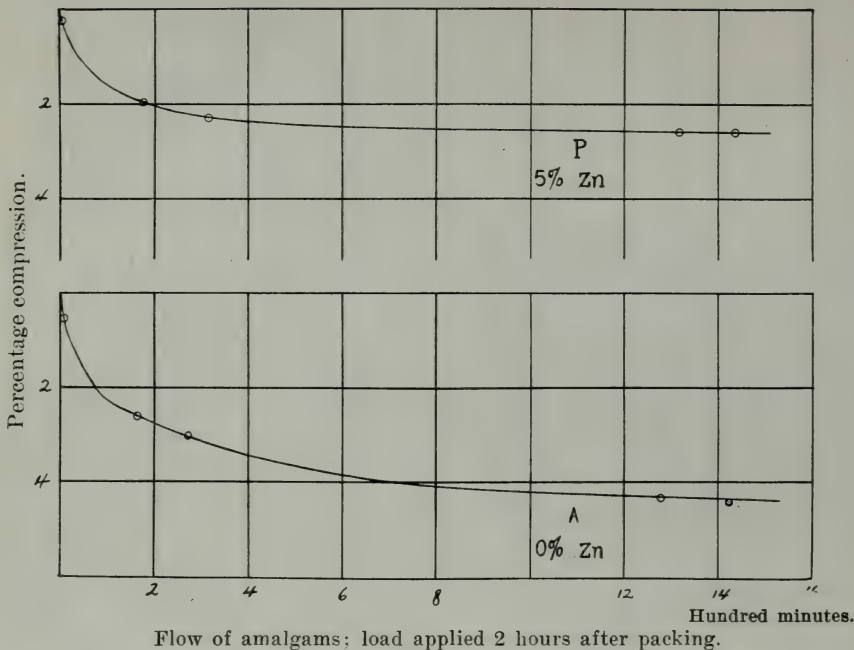
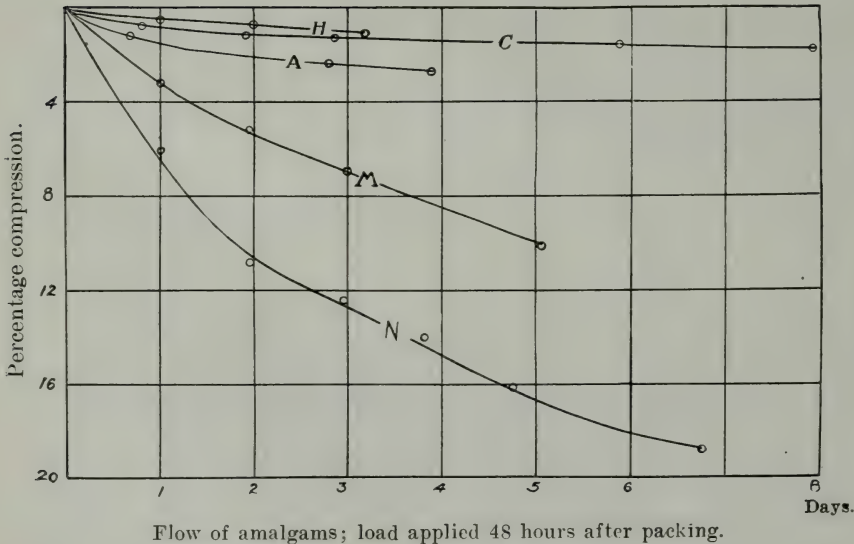


FIG. 25.



The two ends of the specimen are cut at right angles to the axis and placed between the jaws of the micrometer. As the amalgam is compressed by the weight applied at the top of the rod the indicator moves around the dial. The difference of readings gives the amount of compression or flow. An air cushion plunger incorporated in this micrometer prevents injury to the instrument should the specimens fracture suddenly.

Changes in length are indicated on the dial. These are recorded as per cent. change in total length. Figs. 22 to 25 are included to portray the average behavior of amalgams when subjected to this test.

Fig. 22 was plotted from data taken under the above conditions. Two hours after amalgamation and packing, the specimen was placed in the compression-micrometer and a pressure of 3200 pounds per square inch applied. In thirty minutes it was compressed 4 per cent. This specimen did not flow materially after 10 hours, due to the fact that the cylinder had been ruptured and was spread over a much larger area, thus reducing the effective pressure per square inch.

There was a possibility of this apparent recovery in ability to resist flow being attributable to delayed crystallization (slow setting), so additional specimens were prepared and retained 48 hours before being subjected to the flow test. The same amalgam under this treatment was compressed 18 per cent. and fractured after 3 days, see Fig. 25 N.

Fig. 23 is plotted for another amalgam, compression started 2 hours after packing. This alloy was marked "Quick Setting." Fig. 24 (top) indicates the flow of a 5 per cent. Zn amalgam and the curve at the bottom is for a non-zinc amalgam. The amalgams in Fig. 25 were not subjected to the one-tenth load until 48 hours after condensing. Amalgam N is the same as that used in Fig. 22.

Most amalgams will withstand this test remarkably well at one hour and some at 30 minutes after packing. The qualities producing failure seem to be

inherent and permanent in the material (probably chemical compositions) and permit failures after 48 hours as readily as after 30 minutes; the so-called slow-setting or quick-setting qualities being difficult to interpret.

The above may appear to be a new feature, but such is not the case, as it is simply a modification or improvement on the Black dynamometer in which a set of levers operating a dial hand is used to indicate the compression during the crushing tests. The constant, continuous load of one-tenth the crushing value is selected as appropriate for deciding upon the merits of an amalgam when used in a cavity where it is required to furnish a contact point with an adjacent tooth or filling and where constant pressure is applied. The permanence in shape and position of this contact point will eliminate later troubles and constant annoyances due to food particles which tend to wedge between the teeth. The possibilities of position changes are of importance and the inevitable upsetting of the amalgam tooth margins needs only mentioning to bring one to realize the gravity of such situations. The point of a tooth from an opposite jaw constantly striking an amalgam may apply an effective load of several thousand pounds per square inch even though the gross pressure is only a few pounds. The smallness of the area of contact has the effect of intensifying the impacts when considered in terms of pounds per square inch. The material is being treated in a manner very similar to that employed in battering the head of a rivet where light taps continued for a short time are quite sufficient to change the entire cylindrical end into a flat bur.

#### VII. Crushing Strength.

As previously stated crushing strengths have been found dependent upon the time occupied for the test. The tests included in this report were made as rapidly as convenient, using a specimen 6 mm. in diameter and 10 to 12 mm. long. While not of the size specified by the American Society for Testing Materials, mentioned previously, they are a

close approximation to the form. The preparation of specimens one inch in diameter and two and one-half inches long would introduce factors and difficulties of trituration and condensation which are never encountered in practice; to say nothing of the enormous expense necessary to produce such quantities of alloy.

The regular testing-machine equipment of the Bureau of Standards was used for these tests. The time required for each crush was about 3 minutes. Tests were made 14 days after amalgamation. All materials included in this test were made up according to the regular dental technique, in fact extra specimens were made up by a practicing dentist and tested for comparison, and concordant results were found.

By mechanically packing the specimens under high pressure, immediately after amalgamation, it is possible to secure crushing tests of almost twice the values given in the table at the close.

The results of compressional tests are somewhat irregular, but no more so than those found by other observers. It is felt that the comparisons between alloys make these data worth presenting.

Since these tests were for comparison and were made under similar conditions no extra precautions were taken to control temperature, which was constant at about 25°C., probably within two degrees.

#### VIII. Blackening of the Hand.

This test consisted in mulling specimens in the hand two minutes after having first been amalgamated for one minute in the mortar. The hands were first washed, rinsed several times and then dried to make sure that tests were comparable. A zero value indicates that no blackening was detectable. Ten represents a complete and dense black coat or film left in the palm. The values given are the average of several tests by different manipulators. In no case was there a variation of over two points, due to different tests or observers.

The authors will not attempt to pass on the merits of this test. The discoloration of the hand does not *a priori* imply

a discoloration of the tooth tubuli. The free sulfids or combinations of foreign materials producing this blackening require further study to determine their true effect in amalgam usages.

#### IX. Chemical Composition.

The chemical compositions vary from 45 to 69 per cent. silver and from 0 to 5 per cent. zinc, copper and tin making up the remainder.

For practically all alloys the claim of balance according to the G. V. Black standard is made, which can probably be interpreted to mean that the resultant filling should expand slightly, never contract, and after a few hours "lie still."

While absolutely exact percentages should produce exactly the same alloys if similarly treated it is very probable that other factors enter which are far more significant, *e.g.*, a certain alloy triturated three minutes gave 5 microns expansion in 24 hours. This same alloy gave 15 microns contraction when triturated for 30 minutes. A similar behavior was found for other alloys. Over-annealing while exposed to the air at 120°C. for 2 hours in an electric oven produced little change in this chemical expansion or contraction, although it did render the alloy slow setting and of granular consistence while being mullied. Balancing an alloy then becomes meaningless unless proper instructions are given for time of trituration, etc.

In this investigation comparatively little interest was paid to the manufacture of alloys since the purpose of the research was to test the finished product. No effort was made to run a set of definite percentages of materials to recommend the proper proportions for a perfect alloy;—the companies doubtless prefer to have this left as their field. The properties of cleanliness, size of cut, time of setting, working qualities, annealing and the like must all be incorporated in the material, and each manufacturer will endeavor to strike an average such that the alloy will contain a maximum of desirable qualities.

Certain desirable or undesirable prop-



erties are supposed to accompany excessive or deficient amounts of the constituent metals, *e.g.*, alloys of low percentages of silver are supposed to be deficient in strength, of poor working qualities and slow setting, *i.e.*, tend to flow badly. These facts were verified qualitatively only (see Table 3).

High percentages of copper are said to produce discoloration; this of course should be or may have been settled by the dental profession. However, an amalgam made from an alloy containing 16 per cent. copper was discolored, when exposed to a weak solution of iodine, very much more than any of four others containing a lower amount of copper.

Zinc has long been considered a "disturbing" element. The claim is often made that zinc is "inadmissible" even in the smallest amounts; and that all amalgams containing zinc will "move." Since this movement is supposed to be cumulative and to extend over a period of years, it is impossible to furnish data extending over a period sufficiently long to be of decisive value.

A number of specimens have been prepared and are under observation. These have been divided into two groups, one

The group subjected to temperature variations (0 to 50°C.) have suffered much greater changes. Here the average departures from initial length appear to favor the zinc amalgams, the average departure being 0.1 per cent., while the average departure for non-zinc amalgams is 0.2 per cent. The extremes of the former are 0.02 per cent. and 0.5 per cent. and of the latter 0.06 per cent. and 0.4 per cent.

Manifestly no definite conclusions can be drawn from the comparison at this time. At a later date it will be possible to give more conclusive evidence bearing on this phase of the problem.

#### X. Electrode-Potential Determinations.

The normal calomel half cell and potentiometer was used in measuring the potentials. A description of this instrument may be found in any textbook of physical chemistry. All values except the last are for the resultant amalgam using the alloys specified. A number of amalgams, ranging in values from 0 to 5 per cent. zinc, were tested. These are given in Table 2. The potentials are expressed in terms of volts, electromotive force.

TABLE 2.

Alloy.	E. M. F.	Alloy.	E. M. F.
0% Zn . . . . .	—0.54	1% Zn . . . . .	—0.52
" (duplicate) . . . . .	—0.55	2% Zn . . . . .	—0.52
0% Zn 16% Cu . . . . .	—0.52	5% Zn . . . . .	—0.51
" (duplicate) . . . . .	—0.52	Gold (metallic) . . . . .	+0.002

of which is kept at room temperature; the other is subjected to temperature variations between zero and 50°C. At the end of the fourth month, the first group had changed in length by values ranging from 0 to 0.2 per cent; one zinc amalgam showing the zero change, another zinc showing the 0.2 per cent. change. The values obtained by averaging the changes of zincs against the non-zincs, disregarding signs, indicates a more nearly permanent state for the latter.

No conclusive inferences are to be drawn from these tests, although there seems to be little evidence of excessive contact E. M. F. effects due to the larger zinc content.

These tests seem to point toward a complete solution of the zinc (at least) by the mercury. This finding is in harmony with the practice of giving zinc electrodes a surface amalgamation to prevent local action, due to impurities when placed in the solution of the electric cell.

TABLE 3. COMPARISON OF AMALGAMS.

[illegible]





TABLE 3. (Continued.)

Alloy.	Crushing strength in pounds per square inch.	Per cent. flow in 24 hours.	Relative blackening.	Setting changes, first 24 hours (all values in microns per cm.).		
				Maximum contraction.	Maximum expansion.	Final state.
<i>M</i> Ag 54 Zn 1/2	30400 34300 30300	36.0	10	39.1	0.0	—28.1
<i>Claims.</i> No shrinkage, no discoloration. A tooth saver. Any higher price cannot buy a better alloy. An honest, efficient filling material. Takes a high polish and keeps it.						
<i>N</i> Ag 45 Zn 2	30850 38500 30000	47.1	7	7.8	0.0	—3.8
<i>Claims.</i> Non-shrinkage, non-expansion. Edge strength, retention of color.						
<i>O</i> Ag 67 Zn 1 2/3	40750 34000	2.5	2	1.9	0.0	—1.9
<i>P</i> Ag 60 Zn 5	41200	2.6	1	7.2	0.0	—4.5

Table 3 gives a brief comparison of the more important qualities investigated. Some of these are readily verifiable by the interested dentist who cares to spend the money necessary to purchase the alloys. Others require special apparatus or the services of a testing laboratory, to determine the crushing strength and flow, while others require apparatus of such high precision that, in addition to the apparatus, it is essential to have the tests carried out by a person skilled in the use of such apparatus, to insure accurate determinations of expansion and contraction.

The claims tabulated are those made on the label of the package or in advertisements placed before the public in recent years.

It is a regrettable situation that in-

dividual practitioners will find it practically impossible to make complete tests on the materials supplied as balanced alloys to conform to methods of Dr. Black, or any formula or specification. However, it is felt that the manufacturers turning out products which are of a questionable value will welcome any move to place this work on a scientific basis, thus eliminating the necessity for lower standards often used in the fields where price is considered before permanence.

There may possibly exist a place for the materials of low qualities, *i.e.*, tendency to flow excessively or to contract on setting, which necessitates their production and place in the market. If so, specific information should accompany each package, giving full details.

### XI. Summary.

A survey of the previous work on the physical properties of dental materials reveals a large amount of qualitative work on certain properties with instruments, the inherent errors or sensitiveness of which are comparable with the magnitude of the effect under investigation.

Many of the essential properties have not been considered and in some cases a careless interpretation of results has led to considerable confusion.

Recent work by Dr. Gray, of Milford, Del., with improved apparatus, has indicated the possibilities and importance of obtaining qualitative results on more of the properties. At the request of a branch of the Government the authors undertook such an investigation.

An inspection of the instruments in general use disclosed their lack of sensitivity and necessitated the construction and employment of more suitable apparatus.

Accuracy and efficiency recommended the use of the interferometer for determinations of thermal expansion and setting changes, since the necessary accuracy can be secured with the use of small specimens, the temperature of which is readily controlled.

For crushing strength determinations, the calibrated testing machines of the Bureau of Standards were used. For the flow tests it was found desirable to select a special instrument. This instrument consists essentially of a precision dial micrometer equipped for applying constant, continuous pressures to specimens.

The electrode potential measurements were made with the calomel half cell and potentiometer, which is standard apparatus for such measurements.

Careful chemical analyses were made

to determine the constituents of the different alloys.

The results of the determinations of the properties tested, which are represented in the accompanying curves and tables show the behavior of different alloys and the effects of different conditions and manipulations upon the same alloy.

Because of our lack of sufficient clinical experience, we have not attempted to speculate on our data except under definite physical conditions, but have attempted to emphasize to the profession some of the important properties, together with a means of determining the same.

We are pleased to make the following acknowledgments of assistance:

Dr. H. D. HOLLER, Bureau of Standards, for measurements of electro-motive force; Miss H. C. BAKER and Mr. A. M. WEBER, Bureau of Standards, for determining crushing strength of specimens; Mr. J. H. SCHERRER, Bureau of Standards, for chemical analyses; Mr. R. L. COLEMAN, Bureau of Standards, for amalgamating numerous specimens, etc., and to the following manufacturers co-operating: The Atkinson Laboratories, The L. D. Caulk Co., The Cleveland Dental Co., The J. M. Ney Co., and The S. S. White Dental Mfg. Co.

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BUREAU OF STANDARDS,  
WASHINGTON, D. C.

## A Practicable Root-canal Technique.

### V: Therapy.

By ARTHUR B. CRANE, D.D.S., Washington, D. C.

(Continued from page 143.)

THE upward progress of dentistry has been marked from the beginning by a tendency to perfect the purely mechanical and compromise with the therapeutical. In the struggle to reconstruct our root-canal technique to meet the requirements of advanced medical thought history has repeated itself. While many operators are capable of opening and filling root-canals in a satisfactory manner, it is doubtful if any thoughtful dentist can approach root-canal work with the same degree of assurance that he would undertake the making of an inlay or a crown. The cause of this hesitancy lies in the uncertainty of accomplishing the eradication of the infection. Until some scientifically correct method of making cultures in root-canal work is determined, the sealing of the canal will be fraught with the dangerous possibility that the infection still persists. While awaiting this discovery a careful study should be made of the possibilities and limitations of sterilization in periapical disease. Such a study requires a visualization of the pathological condition of the tooth and its investing tissues.

In a typical case of periapical infection the tooth is pulpless, and the canal contains more or less infected organic matter. The contents of the dentinal tubuli have undergone a change due to the action of the invading bacteria. This degeneration may be confined to the immediate region of the canal, but except in cases of short standing, it extends well toward, if not quite to, the

dento-cemental junction. Wherever this change has occurred the dentin is not only dead, but infected. Externally the cementum covering the root apex may be necrotic to a greater or less extent and saturated with the products of infection.

Of the investing tissues the attachment of the apical fibers of the pericementum has been destroyed, and this destruction often extends to the fibers of the oblique groups as well. To the extent to which this detachment has deprived the cementum of its blood nutrition, an irreversible change has occurred in the hard tissues.

The cancellous bone surrounding this necrotic portion of the root has undergone a rarefying osteitis, in which process an infected granulation tissue has been substituted for the normal bone. The surface of this proliferating tissue which approximates the necrotic tissue has a tendency to undergo an indolent liquefaction, and in advanced granulomata this metamorphosis also takes place where the soft tissue comes into contact with the bone. In either instance the hard tissue deteriorates. The cementum becomes roughened and the bone becomes softened.

If the foregoing clinical picture is in accordance with the facts, it must be acknowledged that, in cases of periapical infection, infection exists in the following sites: (1) The canal and canal walls; (2) the dentinal tubuli; (3) the apical cementum; (4) the granulation tissue investing the apex; (5) often in the bone adjacent to the granuloma.



Further, it must be recognized that each of these areas is dependent upon or contributory to the others, hence it cannot be assumed that sterilization is complete until the infection in each of these sites has been eliminated.

The difficulty of thoroughly sterilizing these interdependent seats of infection is augmented by the fact that both living and dead tissues are involved. The researches of Carrel, ratifying and amplifying the findings of many previous investigators, are decidedly convincing in the conclusion that infections in living tissue can seldom be overcome by saturating them with drugs strong enough to destroy the tissue cells. In dead tissue, on the other hand, dependence must be placed upon the germicidal effect of poisons brought into actual contact with the invading organisms. It would appear, then, that the attempt to sterilize both living and dead tissue by the same agency is irrational and impracticable.

With these facts in mind let us proceed to a consideration of the most widely accepted methods of tooth treatment in an effort to determine why they are successful and wherein they fail.

#### USE OF DISINFECTANTS IN ROOT-CANALS.

For the purpose of disinfecting dentin dependence has always been placed on the action of drugs. At first empirically, and latterly more scientifically, the dentist has sought to accomplish with disinfectants in the teeth what the general surgeon has also attempted in other tissues. The trend of modern surgery, however, is to place more and more dependence upon the vital resistance of the tissues. By control of the inflammatory reaction, infection is inhibited and repair ensues. In dead tissue, on the contrary, there is no inflammatory reaction to control, and sterilization can only be effected by the direct action of bacterial poisons. The greatest drawback to success in this necessity is the difficulty of confining the treatment to the canal, for agents which might be depended upon to sterilize the canal and dentin are generally so inimical to the

vitality of the periapical tissues that we have been repeatedly warned by careful investigators to discontinue the use of all irritating drugs. Other investigators, equally careful, claim that only by the use of such drugs can dentin be sterilized, and that periapical damage is due to faulty technique, rather than the inherent property of the medicament.

Light may be thrown upon this controversy by a consideration of the theory that, in destroying bacteria by the use of drugs, there is most probably a definite chemical reaction by which the characteristics of both bacterium and drug are lost and inert substances produced.

As in any chemical reaction an excess of either of the factors will remain unchanged with all its original characteristics. In the nice reactions which Buckley has worked out to show the rationale of formocresol medication this possibility is not accentuated, although he is insistent upon the use of minimum quantities of this drug. It would be fatuous to deny that many teeth have been restored to health and usefulness by the aid of this and other powerful drugs, but this result has been obtained by a chance happening upon just the proper amount of the remedy for the particular case; where used in excess nothing but harm has resulted.

#### THE HOWE SILVER NITRATE METHOD.

The treatment of root-canals by a silver reduction method, as suggested by Howe, is a valuable therapeutic agency in many cases. The chemical reaction which occurs, however, is subject to the same possibility of excess of either reagent. Howe therefore advises that after the mixture of the two solutions in the canal is complete, the excess should be absorbed with cotton points, and the canal again flooded with the silver solution to take care of any excess of formalin remaining. The dense black stain which inevitably follows its use tends to limit the employment of this treatment to certain posterior teeth. This statement is made in full knowledge of the methods which have been

devised to protect the coronal dentin from the stain, and at the same time also prevent its sterilization. If eugenol or any other drug can be depended upon to sterilize the coronal dentin it would seem that it might be equally efficacious in the dentin of the root.

#### THE DAKIN SOLUTIONS.

A group of substances studied by Dakin and elaborated by others has made possible a new technique in the surgery of suppurating wounds. The attempt to make use of these drugs in root-canal therapy has not been an astonishing success, for the reason principally that, when the solution comes into contact with the secretions from the periapical region or the fluid débris of the dentinal tubuli, it is so diluted that in fifteen or twenty minutes no active substance remains. Concentration can only be maintained by constant renewal of the agent. By mixture with stearates or neutral oil this tendency to dilution is somewhat overcome, and this is one reason for the more favorable results with dichloramin-T.

#### POTASSIUM-SODIUM AND SULFURIC ACID.

Happily the organisms with which we have to deal in root-canal work are not highly resistant. If a mild germicide can be brought into actual contact with the bacteria in proper concentration for a sufficient period of time, all that can be expected in the control of the infection will be accomplished. To achieve this end it is necessary to first deplete the tubuli of the organic content as thoroughly as possible. If sodium-potassium alloy has not already been used, it should be used now for this object, the débris scraped from the canal walls with Donaldson broaches, and the canal washed out with alcohol. With a Sausser irrigator the canal is then gently flooded with hydrogen peroxid. This is dried out with cotton points and the canal walls painted with 30 per cent. sulfuric acid, worked with a roughened

platinum broach. This in turn is absorbed with cotton points. This treatment tends to deplete the dentinal tubuli of their organic content, and goes far toward sterilizing the dentin. Possibly in many cases this can be completed by dressing the canal with antiseptic oils. According to Black the oils possess the property of soaking into dentin and displacing its watery content. Whether such weak germicides as 10 per cent. solution of beechwood creasote in oil of cloves, Black's "1-2-3," or apinol retain their potency when they thus saturate the deeper portions of the dentin is a subject for further investigation. Clinically they seem to answer the requirements, and at least their use is not attended with danger to the periapical tissues.

Dead dentin, like other necrotic tissues, when retained *in situ* must be considered a foreign body. It can be made innocuous only by sterilization and the obliteration of the canal.

The sterilization of the periapical region presents an entirely different problem. For this purpose formaldehyd gas released from various solutions, phenol, and other caustics, have proved too treacherous to be longer depended upon for routine practice, and non-coagulant drugs have apparently little effect on granulomatous tissue.

#### IONIZATION.

There has been much discussion of late of so-called "ionization," fostered assiduously by the manufacturers of switchboards to be used for this purpose. Owing to lack of a proper conception of electro-chemistry and electro-biology much confusion has resulted from the spread of questionable theories. Notwithstanding this, the clinical results of electrolytic medication are so encouraging that it is being advocated as the best present means of treating periapical granuloma. Whether the dentin is sterilized to any considerable depth by this agency is open to serious doubt. In order to understand the rationale of this



method of treatment certain chemical and electrical phenomena must be studied.

It will be recalled as one of the early lessons in chemistry that certain elements are classed as positive and the others as negative. In the union of the elements to form compounds the negative unites with the positive. Thus when the chlorine atom, which is negative, unites with the sodium ion, which is positive, the result is a molecule of sodium chlorid, which is neutral; that is equally positive and negative. It is now accepted that the attraction which holds atoms together to form molecules is electrical, and is accomplished by the transfer of one or more electrons from the positive to the negative element. These electrons may be expressed as the bands which bind the elements into compounds.

When a substance such as sodium chlorid enters into solution there is a dissociation or loosening of the attachment between the positive and negative atoms, by which they have more independent freedom of movement than when combined in sodium chlorid in the solid state. A compound decomposable by the electric current is called an electrolyte. When an electrolyte is dissolved in water the atoms which form the molecule become dissociated to an extent which permits their orderly movement with the electric current when it is passed through the solution.

This movement may be more easily understood by a comparison of the "all hands around" of the old quadrille. The dancers on the ballroom floor represent the electrolyte in solution. The men represent positive atoms and the ladies negative atoms. Each man (or positive atom) faces his partner (or negative atom) and gives her his hand (or electron), and thus the molecule is formed. Now the music starts (corresponding to the making of the electric current), and the man passes his partner and gives his hand to the next lady, at the same time letting go the hand of his partner. Thus a new molecule is formed and this change of partners continues until the

music (or electric current) ceases. The ladies (or negative atoms) are always traveling in one direction and the men (or positive atoms) are always traveling in the other. To more nearly simulate the movement of ions, we must conceive of the "all hands around" as taking place in a straight line rather than in the customary circle. Thus, when the man (or positive atom) reaches the end of the line he will find no partner and will be set free, and the same holds true of the lady (or negative atom), so that men (or positive atoms) are made free at one end of the line, while ladies (or negative atoms) are released at the other. These traveling atoms are called ions. When an electrolyte enters its solution, so that the attachment of the electrons is sufficiently loosened to render its constituent ions capable of thus traveling with the electric current, it is said to be ionized.

Ions are electro-negative or electro-positive. For general purposes it will be sufficient to remember that the metals form positive ions, while the halogens and acidic radicals form negative ions, but it must not be assumed that all compounds can be ionized. The electro-negative ions are conducted against the current and flow toward the positive pole, thus constituting what is known as the negative current. The positive ions conduct the positive current and flow toward the negative pole. With the foregoing comment as a basis we may now comprehend the clinical application of electrolytic medication.

The root-canal must have been opened and the apical foramen enlarged. The rubber dam is adjusted and all aseptic precautions observed. The canal is now flooded with an electrolyte, that is to say, a watery solution of the chemical from which the ions are to be derived.

If treatment with metallic ions is desired, the positive electrode must be placed in the electrolyte and *vice versa*. This is done by means of a needle, which fits into the root-canal, held in an insulated terminal on the desired pole of the battery. The opposite electrode must now be brought into close contact



with the skin or mucous membrane of the patient. The usual method is to attach or hold it on the cheek, adjacent to the tooth. The current is now turned on and, by manipulation of the controllers, is cautiously passed through the tissues and gradually increased in strength until the point of tolerance is reached. This will usually be around two milliamperes. Care must be exercised that the current is not short-circuited by contact of the needle electrode with adjacent teeth, metal fillings, or moisture leaking through the rubber dam. Multi-rooted teeth may have all roots treated simultaneously by passing a separate needle into each canal and twisting or clamping them together. In this event the amount of current which will pass through the various apical openings will differ, and for this reason it is better practice to treat each root separately.

If the indicator on the milliamperemeter vibrates with coincident painful shocks, it is an indication that somewhere along the path of the current there is a loose connection which should be looked for in the switchboard or terminals, between the electrolyte in the canal and the periapical fluids, or between the indifferent electrode and the tissues. Enough of the electrolyte should be added from time to time to compensate for evaporation. When the treatment is completed the current should be very gradually reduced to zero and then turned off. The most disagreeable shock is caused by the making and breaking of the current, hence the electrodes should only be applied or removed when the current is turned off at the switch. After removal of the electrodes any excess of electrolyte should be absorbed from the canal with sterile cotton points before dressing and sealing the tooth.

It is most probable that electrolysis only carries the ions of the electrolyte a short distance into the periapical tissues, for the current upon reaching the multiplicity of ions contained in the body fluids is given up to them. Thus if ions of zinc are carrying the current

through the apical opening, they will shortly transfer it to sodium ions or calcium ions or other electro-positive ions already existing in the tissue juices, much the same as the baton is transferred from one set of runners to another in a relay race. It is by such transference that the electric current passes through the body from one electrode to the other.

Considering this phenomenon it is doubtful, as has just been stated, if ions from the electrolyte are deposited to any appreciable distance beyond the apical end of the root by electrolytic medication. This does not express the limit of their distribution, however, for provided precipitation does not occur, diffusion begins as soon as the ions are introduced into the tissues, and continues actively for upward of twenty-four hours. The maximum beneficial effect, if any, produced by the ions, is therefore not immediately upon their introduction, but after diffusion has ensued.

The two leading American dental writers on electrolytic medication, Fette and Prinz, are at variance in their selection of an electrolyte. The former, adhering to the technique of Sturridge, advises the use of zinc chlorid with a needle of zinc as the positive electrode; the latter, the use of sodium chlorid with a platinum needle on the positive pole. Surprising as it may seem, both claim the same efficient results. To avoid confusion let us examine each of these methods separately, and see what takes place.

#### FETTE'S TECHNIQUE OF IONIZATION.

When Fette's technique is used, as soon as the current begins to flow zinc ions pass through the apical opening, and at the same time chlorin ions begin to collect about the zinc needle, with which they unite to produce additional zinc chlorid. It will be seen that any antiseptic action due to this technique must depend alone upon the zinc ions. According to Krönig and Paul the germicidal value of a metallic salt depends not only upon its specific character, but

also upon its electro-negative ions. Zinc ions as such have no demonstrable antiseptic value, hence if they contribute to sterilization it must be that during the process of diffusion they unite with certain pre-existing negative ions in the periapical fluids, to produce a solution of an antiseptic salt.

#### PRINZ'S TECHNIQUE OF IONIZATION.

In the method advocated by Prinz, when the current begins to flow sodium ions pass through the apical opening, while chlorin ions collect about the platinum needle. As platinum is not ionized, the chlorin ions unite with each other to form free chlorin, with the possible formation of infinitesimal quantities of hydrochloric acid as a by-product. In this technique the deposition of sodium ions can only add to the abundant supply of those already existent in the tissues, therefore the antiseptic value, if any, must be dependent upon the chlorin ions. Price claims that these have no antiseptic value, but as free chlorin is produced in the canal by their union the argument is hard to follow. The relative sterilizing value of chlorin thus produced, compared to chlorin released from Dakin solution irrigations for the same period of time, or from treating with chlorinated lime and acetic acid according to the old bleaching method of Truman, would depend upon the amount of free chlorin available by each procedure.

#### THE AUTHOR'S TECHNIQUE OF IONIZATION.

My own practice has been a combination of the two methods just studied, using zinc chlorid as the electrolyte and a platinum needle on the positive pole, and thus zinc ions pass through the apical opening and free chlorin is released within the canal. Evidently any therapeutical result which may accrue from either is obtained. There is little scientific evidence, however, to indicate any inherent sterilizing value in dissociating either of the foregoing elec-

trolytes with the amount of current which the average patient can bear.

A third electrolyte which presents a somewhat different aspect is Lugol's solution. This consists of iodine crystals, 5 parts, iodid of potassium 10 parts, and water 100 parts by weight. When the negative electrode is introduced into this solution in the canal, the ion  $I_3$  is carried into the periapical tissues. Iodine as such is not ionized, hence the necessity for adding iodid of potassium to the solution. In this connection the well-proved antiseptic value of tincture of iodine should not be mistaken as an index of the value of  $I_3$ . However, I am each day becoming more favorably impressed with the clinical value of this electrolyte.

The direct inherent sterilizing value of electrolytic medication being so inconsiderable, it would appear that the well-recognized clinical benefits following its use must be dependent upon some change produced in the tissue cells.

It is reasonable to believe that granulomata persist at the root apex without objective symptoms, because the strain of streptococcus, which is uniformly conceded to be the infecting organism, is so low in virulence that inflammatory reaction is only passive. The absence of all the classic symptoms of inflammation is confirmatory of this belief.

The vital resistance of living tissue to infection is developed and increased by the inflammatory reaction, provided it does not proceed to a point of excessive activity. There is a pouring out into the infected area of white blood cells which have the power of ingesting the invading organisms, and of a blood plasma of high bacterial power. The inflammatory process and repair are very similar and often coincident.

Electrolytic medication offers an easily controlled means of thus calling to our aid the defensive forces of nature. While the limited antiseptic action of the ions may serve to some extent to attenuate the invading organisms and thus aid in the ultimate result, it is a clinical fact that the use of the current is often followed by a varying degree of inflammation, signalized by pain, heat, redness,



and sometimes swelling. The inflammatory reaction may be and often is induced in other ways and by other agencies. Indeed it is doubtful if the treatment of many cases of periapical disease is carried to successful completion without the tooth becoming sore at some stage of the treatment, no matter what the technique.

#### CONTROLLING THE INFLAMMATORY REACTION FROM IONIZATION.

The inflammatory reaction having been induced must be controlled. This may be contrived in mild cases by the use of counter-irritants, such as iodine, mustard, or capsicum. A method which not only tends to control the inflammatory process but also has a gratifying inhibition on pain symptoms is the electrolytic use of Fisher's salts, as described by Fette. A four or five per cent. solution of magnesium sulfate is applied through the apical mucous membrane with the positive current. The dosage is about 20 M.A.M. The instant there is an indication of excessive reaction, however, recourse should be had to drainage. The recognition of the value of this expedient dates back to Hippocrates at least, and this is Nature's own method of fighting pyogenic infection. Yet, strange as it may seem, many dentists fail to avail themselves of so simple a remedy. The promotion of the inflammatory process and the establishment of drainage by means of a small window cut through the alveolar plate into the cancellous bone of the periapical region will in many cases mark the beginning of repair in periapical disease.

Infected apical cementum presents the most inaccessible and troublesome factor in root-canal therapy. For reasons already referred to, this dead tissue cannot

be bathed in chemicals strong enough to destroy the micro-organisms, nor has it any power of inflammatory reaction. It may be that to some extent it is acted upon by the inflammatory exudate, or by drugs which inadvertently escape from the canal, but if so the effect must be very superficial. Hence, unless the denuded area is small enough to be successfully covered in the root-filling operation, its surgical removal is indicated.

#### CONCLUSIONS.

1. No sterilization of infected teeth can be said to be complete unless it includes the canal and tubuli, the denuded cementum, and the periapical tissues.
2. The same agency cannot be depended upon to complete sterilization in all these sites.
3. The canal and dentinal tubuli can probably be satisfactorily sterilized by the thorough use of sodium-potassium alloy and 30 per cent. sulfuric acid, followed by dressings of mild antiseptic oils; or by Howe's silver reduction method.
4. The periapical region may be sterilized by inducing the inflammatory reaction by means of electrolytic medication, followed by immediate and sufficient control.
5. The apical cementum can at best receive but superficial sterilization, and unless the denuded portion is small enough to be successfully capped with gutta-percha, it must be surgically removed.
6. The establishment of scientifically correct culture methods and media is the crying need of the moment. Until this is accomplished the filling of the canal must be a probationary expedient.

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(To be continued.)



# Facts and Theories of Evolution, with Special Reference to the Origin of Man.

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## Part I.

### Theories of Evolution.

WITH your permission I shall divide this talk into two parts, first, a brief summary of some of the major facts, principles and theories of evolution, and, secondly, an endeavor to make an application of these facts and principles to the problem of the origin of man.

You are well aware that historically the two leading theories, or explanations, of evolution are Lamarck's theory of the inheritance and summation of the effects of use and disuse, and Darwin's theory that evolution has been brought about chiefly through natural selection and the survival of the fittest.

#### LAMARCK'S VIEW.

One of Lamarck's classical instances of the supposed inheritance of the effect of use was the elongation of the neck of the giraffe. Here is a picture of the okapi, a short-necked giraffe which still survives, showing the state of the giraffe before the great elongation of the neck. Lamarck's theory was that the race of giraffes, by constantly stretching their necks, gradually elongated them. I need hardly remind you that the evidence as reviewed by workers all over the world is strongly against this theory, at least in its crude form, the preponderating view being that the effects of use

and disuse of organs are not transmitted to the offspring. In Lamarck's view the effects of the environment and of habit upon the soma or body of the parents was the more immediate factor in directing the course of evolution.

#### THE GERM CELL.

All modern work tends, on the contrary, to emphasize the fundamental importance of the germ cell in evolution as the seat and source of hereditary characters. The germ cell stands in isolation protected from most influences of the environment by a vegetative zone around the nucleus. If Lamarck's theory were true, the effects of use and disuse would have somehow to traverse that protective zone and influence the nucleus in order to produce a similar effect in the offspring. And if Lamarck's theory were true, evolution ought to take place very rapidly, but the geological records show that on the whole evolution is an almost inconceivably slow process.

#### CHROMATIN.

You are likewise familiar with the important rôle that chromatin, this deeply staining material in the nucleus, has assumed in the theory of heredity, as the supposed bearer of the hereditary

qualities. The transmission of the chromatin from the parent to offspring is here seen. (Illustrating.) We see the approach of the sperm toward the ovum and the fusion of the sperm nucleus with the nucleus of the ovum. Next is a familiar figure of the spindle, by which the cell divides into two, the chromatin material being first brought together and then divided, so that each daughter cell receives half the material. All this process goes on, as it were, behind the scenes, and is only discovered by the special technique of modern cytology.

#### MENDEL'S VIEWS.

One of the greatest names in zoölogy is that of Mendel, whose discoveries deal with the objective side of heredity. You know that Mendel pointed the way toward a quantitative statement of the effects of heredity, and that in typical cases the operation is as simple as making up a prescription; you put certain elements or ingredients into the cross, and in the grandchildren you get those ingredients combined and redistributed according to a definite numerical ratio. This is the objective side of the phenomenon of heredity, the measurable quantitative side, that is, the visible expression of the hidden cytological processes already referred to.

The traditional problem of heredity—why it is that characters are inherited, and the degree to which they are inherited—is practically settled by the combination of these two lines of research, cytology and genetics. And in this well-known diagram (Illustrating) you see the principle underlying the Mendelian theory, when carried back to the processes of the division of the fertilized germ cell.

#### MUTATIONS.

Another, but closely related, line of investigation deals with the phenomenon called mutation. This is the famous evening primrose of DeVries (Illustrating) and one of its mutant derivatives. On the left is the primitive ancestral

primrose, and on the right one of the varieties which suddenly appeared. Such a suddenly appearing new race, which breeds true, used to be called a saltation, in reference to the appearance of new characters by a sudden jump. It has been urged by geneticists that in nature also new characters have appeared suddenly and not through minute gradations. The opposing theory, held by most of the elder naturalists and by many palæontologists, is that as a rule evolution has not taken place through sudden jumps, but through very finely graded and almost imperceptibly small differences, which have been steadily going on through the immeasurably long periods of time. Still other palæontologists are inclined to the opinion that both mutation and slow change have contributed to the end-results.

Here is the celebrated case of the evolution of the horse, illustrated by specimens in the American Museum of Natural History. This series represents a period of time which, with great conservatism, is estimated at three million years. It has taken three million years or more to produce the difference between the small, primitive, four-toed horse on the left and the modern one-toed horse on the right, and the thousands of specimens of fossil horses in the American Museum collections lend strong direct evidence for the view that the evolution was gradual, not by large and sudden mutations.

#### NATURAL SELECTION.

With regard to the principle of natural selection many geneticists deny its ability to produce the observed results of evolution, so long as it has only fluctuating variations to deal with, fluctuating variations being those which conform to the curve of probability and show an equal number of deviations, plus and minus, on either side of the mean. But even Professor Morgan, who is one of the leading dissenters from natural selection as based on fluctuating variations, speaks now of the "survival of favorable mutations," which means nothing more



nor less than the natural selection of such mutations as happen to fit into some available niche in the environment.

I would emphasize the fact that natural selection is not something that acts only in the great crises of life. This slide (Illustrating) pictures a major crisis in the life of an animal when it is overtaken and meets its death; but natural selection operates not only at these great critical moments of birth and death, but every day and every minute, because unless all the millions of cells of an animal are functioning properly any moment something may happen to throw it out of its normal adjustments to the environment. Natural selection is, of course, especially potent in weeding out forms which fall below their competitors in the production of a sufficiently large number of young. The seed must be properly protected so that the embryo may survive through every second of its long and complicated history, while some of the newly hatched young must be able to carry through and live to reproduce their kind. So in the view of palæontologists, natural selection is a ceaseless, endless and cumulative force like gravitation.

Inadaptive structures, things that are out of adjustment to their environment, may survive for a long time, but in the end they tell against the animal. In the laboratory the geneticists find many queer things, produced by mutation or by new combinations of hereditary characters, that manage to get along for a time and are not killed off. Even in nature queer things are able to hang on for some time, but in the end the great net of natural selection is always spread, and its immense series of sieves is always working, rejecting or penalizing the individuals and the races with useless or hurtful characters and favoring those with the opposite qualities.

Here is an illustration showing the effect of hybridizing two breeds which differ in several characters. These two parent plants differ in color and in the form of the flower and of the cluster at the middle. In the second generation you have all these different characters

coming out, exhibiting all possible combinations of these three things. This illustrates two facts which are often cited in modern discussions on evolution: first, that by hybridizing you can add up favorable or unfavorable qualities, you can breed into a strain an unfavorable or a favorable quality, and, secondly, that the varied progeny of hybrids are so diverse that they have different chemical and physical properties, and some of them may be more favorably adapted than others in certain relations to their environment. Therefore it is the view of many geneticists that evolution takes place through the natural selection of favorable hybrids and of favorable mutations.

#### BUFFON'S VIEWS.

The great naturalist Buffon taught that the characters of animals were formed through the direct action of the environment. But for the most part it has been shown by experiment that a change in the environment does not produce an immediate adaptive effect. There are, it is true, experiments tending to show that a change in environment does change certain characters of the animals, although not always in an adaptive direction. For example, when certain mammals taken from the desert, and of a uniformly gray color, are bred for many generations in a moist climate, the color of the coat is said to darken. This is found to be not merely a growth phenomenon, but it is also asserted that even the descendants of those animals, that were originally taken from the desert and modified by laboratory conditions, when taken back to the desert climate tend to transmit the darker coat color which their ancestors acquired in the moist climate. This is still under debate by the geneticists, and I do not pretend to pass judgment on it; but I simply say that in the long run, through millions of years, environment has obviously exercised a guiding effect on evolution. Animals are what they are, partly because they live and have evolved in particular environments.



## CUVIER AND THE GEOLOGICAL RECORD.

I show here a portrait of Cuvier, who was not only the founder of comparative anatomy, but also wrote a great work on the "Revolutions of the Globe," meaning the critical upheavals of the earth's strata, which open up new paths for the dispersal of animals or raise barriers between adjacent regions.

Here is a concrete example of the effect of such revolutions. In every great mountain-forming period the strata are warped and folded and that gives increased opportunity for rapid erosion. Here we have an example of erosion in an early stage. The rain and the frost are cracking this formation, and you see the débris falling down or being carried off by the river. You see also the orderly succession in which these rocks were laid down, and this gives us the chronological sequence, which is of the first importance in understanding the history of life.

After a region has been uplifted, erosion goes on until the whole surface is worn down. A classical example of erosion on a grand scale is seen in the Grand Cañon of the Colorado River. You see this orderly sequence of strata cut through by the river but not otherwise disturbed. The whole region was lifted up as a huge low dome, and the Colorado River is now working its way downward through that dome.

The chronological sequence of living beings is often overlooked by geneticists and laboratory workers. It took millions of years for the sea to lay down those successive strata, and it took more millions of years for the river to eat its way down through a vertical depth of over a mile through that series of rocks. Another thing this scene emphasizes is the destructive power of erosion. It shows that not only does erosion reveal to us the geological record, but it also destroys it, so that our record of past evolution is very fragmentary, and it is only occasionally that we get even approximately complete records for relatively short periods.

Nature has thus wiped out a greater

part of her own records of past evolution, and it is for that reason we cannot give a categorical affirmation or denial of the reality of evolution through mutation or by sudden jumps. We often find related animals differing widely from each other, but we cannot be sure that the intermediate types have not been wiped out. Sometimes, indeed, they are still found living in other parts of the earth. Thus palæontologists cannot categorically deny or affirm the universality of evolution by mutation. But we can assert that where the evidence is very abundant, we get a closer and closer approximation between two related types, and that in such cases evolution appears to have proceeded by minute gradations and not by great jumps.

We have here a good example of the way Nature brings the deep formations to light through uptilting and subsequent erosion of the rocks. Thus deep-lying fossils are brought to the surface, and the time sequence is followed by traveling over the surfaces and not down into the earth. That is the kind of record palæontologists usually have to deal with, and by a study of hundreds of such sections geologists have been able to work out a definite chronological series comprising very many millions of years.

## THE PALÆONTOLOGICAL RECORD.

Now what is the palæontological record of evolution, when under favorable circumstances we get a large series of forms from a closely graded series of formations? During the last nineteen years I have had the privilege of assisting Professor Osborn of the American Museum in the study of a remarkably extensive record of this kind. The results will soon be published in his monograph on the evolution of the titanotheres, which were a race of extinct hoofed mammals that lived in Wyoming and adjacent states during the early part of the Age of Mammals. This slide gives an epitome of the history of that group during a period represented by several thousand feet of rock formation. The

skull of the earliest is at the bottom and that of the latest at the top.

#### DIFFERENTIAL EVOLUTION.

Now exactly what happens in such an evolutionary series? First we find a differential evolution of parts. You see that the front part of the skull (Illustrating) has been abbreviated, while the part behind the orbits is lengthened. Here above the orbit in this early titanotheres we see the beginning of a small bony swelling which in the following stages rapidly enlarges, giving rise to the great bony horns of the latest member of the family. Here, then, is an example of growth and evolution concentrated upon a definite spot or small area. We also find that while the horns have been developed very rapidly the molar teeth have changed but little, so that the crown pattern of the latest members of this family is almost identical with that of the earliest. But while the pattern has changed but little, the proportions have changed notably through the more rapid increase of the antero-posterior diameter.

Thus we have differential evolution, different rates of evolution, changes in proportion of parts and concentration of growth upon small areas. These are some of the kinds of changes that evolution consists of as we see it in palæontology. Knowing this, we can often infer with reasonable accuracy its operation in cases where the fossil record is less complete.

#### INTENSIFICATION OF FUNCTION.

Changes in proportion often accompany an intensification of function. For example, in the evolution of the horse there has been an intensification of function of the middle digit of each foot. The modern horse has a better running foot than the most ancient type, and the change has been concentrated both on the function and on the form of the middle toe.

#### CHANGE OF FUNCTION.

On the other hand, changes in proportion often accompany a radical

change of function. This change of function is one of the most universal principles in all the study of evolution, and all groups of which we know the history for a very long period show a change of function sooner or later in every part of the animal.

This slide is a familiar example in which you see how the fore and hind feet of the seal have become changed in function and made over as paddles.

This is a photograph of a pterodactyl, or flying reptile (Illustrating), shown exactly as it was found in the rock. You can see that the hind feet have not changed in function, but that the fore feet have changed greatly, since they have been made over into wings. Here are the first three fingers, and here the fourth finger enormously elongated and bearing a web of skin. Here is a more advanced relative of the last, and you can now see what an enormous change of function has taken place, and how great has been the intensification of function of the wing finger as compared with the more primitive stage. These animals sometimes attained a spread of wing of over twenty feet, so that they were the largest flying creatures. They were evidently very highly specialized.

#### OVER-SPECIALIZATION.

Indeed, intensification of function finally leads to over-specialization. These great tusks of the mammoth have grown to a point where they begin to curl inward past each other; they must have been a considerable tax on the vitality of the animal, perhaps more a hindrance than a help.

Over-specialization, then, is a constant feature of evolution and finally leads to extinction. Here is one of the great dinosaurs (Illustrating). The race became greatly over-specialized in size and differentiation of parts, and probably this was an important factor in its extinction. Indeed, over-specialization is one of the conditions whereby natural selection operates, since after marked or sudden but permanent changes in the environment the "fittest" to survive



under changed conditions are usually the less specialized members of their group.

#### THE RÔLE OF THE DUCTLESS GLANDS.

While changes of proportion have often been brought about very gradually through long evolution, they sometimes occur suddenly in a single generation, somewhat after the manner of mutations. We can observe in man plenty of examples of change of proportion. This (Illustrating) is a well-known figure of a certain congenital malformation of the human hand where the thumb is reduced in size, one of the joints is left out, and the proportion of the fingers greatly changed. I understand that this condition is associated with some deficiency in one of the ductless glands.

Thus these glands occupy a very prominent place at the present time in medical and zoölogical investigations. The palæontologist as such has nothing to do with them, but he must believe that natural selection has operated by means of these ductless glands, that is, that races have been selected in which these glands were of a favorable character so as to produce favorably adapted hereditary lines. Ductless glands producing unfavorable lines, of course, would be discriminated against by natural selection. It may be perhaps that many of the changes in evolution that I have shown you, relating to the change in proportion, the intensification of one organ at the expense of another, and the like, have been associated with an evolution of the secretions of the ductless glands. For example, we see in this chimpanzee (Illustrating) a partially atrophied condition of the thumb, somewhat like what we saw in the brachydaetylous man, and possibly conditioned originally by similar causes.

#### PARALLEL EVOLUTION.

Next we come to a very prominent fact of evolution, namely, the parallel evolution, in more or less widely unrelated groups, of similar types of body adapted for similar modes of life. Here are two extinct animals (Illustrating);

the lower one is an amphibian, and the other a lizard, yet they are almost alike in general form.

#### HABITUS.

I have called the sum of the adaptations of an animal to a particular mode of life its habitus. Here are three different animals. The uppermost one belongs to the class of fishes, the middle one to the class of reptiles (although it looks like a fish), and the lower one is a porpoise, of the class of mammals. They all have a somewhat similar habitus. For instance, they all exhibit the stream lines of aquatic animals, so it is obvious that they are what they are because of the nature of the medium in which they live, which has a directive influence on the evolution of animals.

Although habits of use and disuse are correlated with evolutionary form, that does not mean that there is a direct hereditary transmission of the effects of use or disuse, but only that habit and form are the result of an age-long weeding-out process. There is nothing inconsistent in the palæontologist's view, that habits, use, and disuse help to control the direction of evolution, and the geneticist's view that the effect of habits cannot be transmitted from parents to offspring, except of course the effects of poisoning or of certain "transmissible" diseases which poison the germ cells.

#### HERITAGE.

The habitus, then, in these three animals is similar, but their heritage is different. We find that they conform to their respective classes in class characters. We find that the dolphin has the class character of the mammals in its reproductive system, its brain, and everything else. So, too, this ichthyosaurus reveals the class character of reptiles in its skeleton, although we have not the soft parts there. The heritage, therefore, is that which reveals their true affinities, while the habitus disguises them.



## SUMMARY OF PART I.

Thus in this very brief sketch I have recalled Lamarck's hypothesis of the transmission of acquired characters to your minds, together with the almost unanimous verdict against this hypothesis by modern zoologists. Next we recalled the highly important part played by the germ cell in evolution, its isolation and protection from most environmental and somatic changes. We then glanced briefly at the elaborate mechanism of cell division, noting the union of the hereditary material of the parent cells and its subsequent division and distribution to the offspring. We saw that in the opinion of geneticists this mechanism affords an explanation of Mendel's discoveries of the numerical basis of heredity; but that in some ways it makes the explanation of evolution itself more difficult than before, and the problem is further complicated by the frequent occurrence of mutations, or spots, which, when crossed with their own kind, breed true.

With regard to Darwin's principle of natural selection, we emphasized that it acts ceaselessly on all the millions of cells in each individual and through every second in the excessively elaborate reactions of the organism with its environment; also that it operates upon great populations and through vast periods of time. We found that many geneticists deny the potency of natural selection, if operating only on fluctuating variations, but practically admit that it has conditioned the survival of favorable mutations. We noted that many palæontologists believe that evolution has been continuous through almost imperceptible changes, rather than discontinuous through mutations, for the very reason that when the fossil records are sufficiently complete they appear to support this conclusion.

We then recalled Buffon's view that the characters of animals are ultimately conditioned in part by the environment, and we held that, if properly understood, this principle is true, that in part the environment has a directive influence on evolution, since it has determined the

lines of adaptation to particular life habits. Passing to Cuvier's far-reaching ideas on the effects of great upheavals of the earth's strata, we saw how Nature preserves the record of past life, how she reveals fragments of it to us, and how she also destroys most of it. We saw also how important is the chronological sequence of organic forms as a record of their evolution. By examining several well-established cases we are able to see clearly some of the actual processes of evolution. We noted, for instance, how in a certain race evolution had produced the differential change of parts, the retarding of one part and the acceleration of another, how some parts changed very slowly, how in others great changes were concentrated in a small area. We found also that such changes in form may imply either an intensification of function or a change of function, and how the latter often leads finally to a complete transformation of the general appearance of the organism, as when whales were derived from quadruped, land-living mammals.

Both intensification and change of function may finally lead to over-specialization, which, after a new change in the environment, is a frequent cause of extinction and a factor in the survival of the fittest—in such cases usually the less specialized members of their group.

We then noted that sudden changes in proportions of certain parts are supposed to be due to a disturbance of the apparatus for the regulation and control of growth, that is, to aberrations in the activities of the ductless glands whose secretions check or stimulate the growth of parts. We also remarked that in the opinion of many the ductless glands had thus played a very important part in the incidence of natural selection upon racial evolution. In closing this part of the address I showed that Nature had often produced similar adaptive characters in widely different races, and that these phenomena of parallel or convergent evolution were very numerous and far-reaching, and a potent factor in misleading naturalists in the classification of races.

## Part II.

## Origin of Man.

With this very general survey of some of the important facts and theories of evolution before us we may pass to a review of what I, at least, believe to be a true history of the origin and evolution of man.

This part of my talk is necessarily addressed only to those who will consent that the possession of a common plan is evidence of a common origin. Here (Illustrating) is a well-known illustration by Haeckel, showing the faces of various adult mammals and the corresponding embryos, and illustrating the common mammalian plan underlying these various types of adult structure. In these embryonic stages that identity of plan is almost complete, so that whether one is dealing with a bat, a goat, a cat, a sheep, or a man, one can identify the rudiments of "anlagen" of the different parts of the head and apply the same terms to them throughout the series. It is evident that we are dealing here with truly homologous parts and not with parts that simply resemble each other. It is the opinion of palæontologists, based on much practical experience, that in comparing structural plans those that show a common heritage have been derived from a common ancestral source. If anyone dissents from this conclusion then my subsequent remarks are not addressed to him, but only to those who will admit, at least provisionally, that a community of structural plan underlying diversity of details is evidence of a common origin.

At the present time there are two leading contrasting theories of the origin of man and of his relationship with other primates. The first, but more recent hypothesis, is that among all the existing primates the nearest relative to man is the *Tarsius* of Madagascar. Dr. Wood Jones of London has called attention to the fact that in a number of anatomical characters the *Tarsius* agrees with man and differs from those of other primates. I show here a figure of the skull of

*Tarsius* itself, and of one of its Eocene relatives which we have in the Museum. It would be desirable, if time permitted, to examine this hypothesis of Dr. Wood Jones in detail, but now I may only say that, from the point of view of those at the American Museum who have worked on the material, this hypothesis of the origin of man is easily disposed of; we feel confident indeed that Dr. Jones is "putting his money" on the wrong primate! (Fig. 1.)

In the modern *Tarsius* we have an excessive development of the auditory parts of the skull and an excessive enlargement of the orbits. These same features are already very clearly foreshadowed in this ancient Eocene type in which the orbits are already greatly enlarged. The molar teeth are of rather primitive construction, but the front teeth, both in the modern *Tarsius* and in this Eocene type, are very specialized. The structure of the foot is essentially the same in both, a peculiar leaping type of foot, which becomes still more specialized in *Tarsius*. It is partly because of these peculiar specializations even of the Eocene relatives of *Tarsius*, that we feel that that group was already widely removed from the ancestry of man.

The opposing theory regards the anthropoid apes as the nearest relatives of man. There is nothing new about this. It was practically realized by all anatomists from the time the chimpanzee was first described as a pigmy race of man down to the days of Darwin, Owen, Huxley, Haeckel and more modern anatomists and palæontologists. It has been indeed almost universally recognized that the anthropoid apes are the closest akin to man.

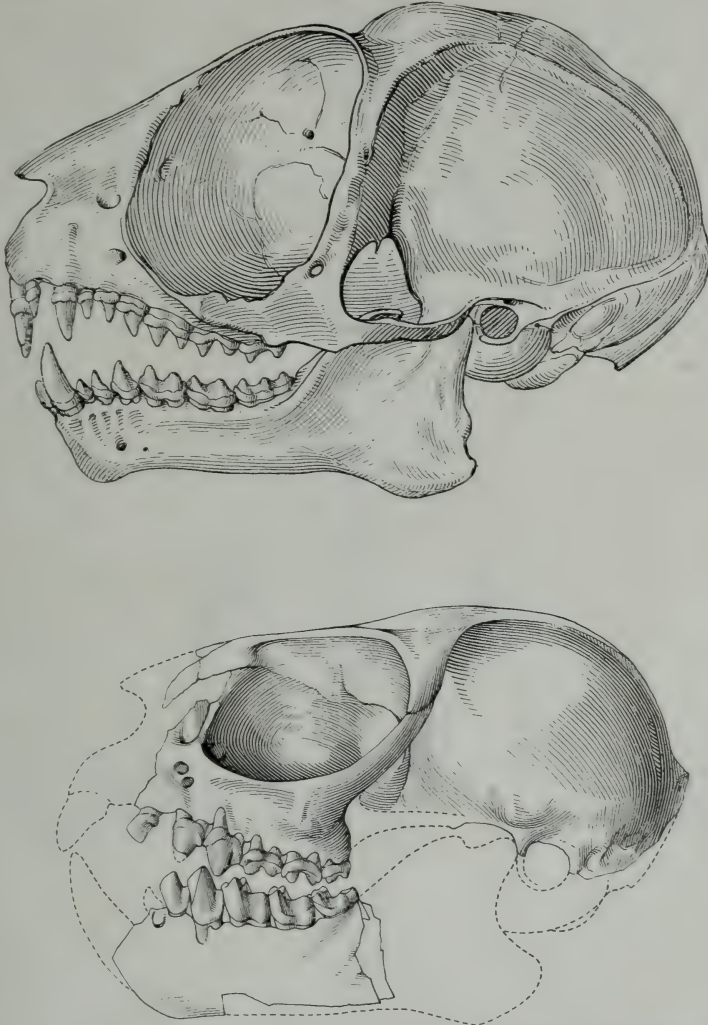
Here are photographs of two chimpanzees (Illustrating) made by Mr. Lang, of the Museum, in the Belgian Congo. My purpose in showing them is that I believe they exhibit fairly well the general type of heritage which we may expect to find in the remote ancestors



of man. A very detailed examination of the anatomy of the anthropoids, especially of the gorilla and chimpanzee, made by scores of anatomists, bears out the view that not only in the adult, but

of the forest-living ancestors of man. Evolution is not a uniform process, but a very uneven process, and as we have seen before, some animals evolve much faster than others. I believe that the

FIG. 1.



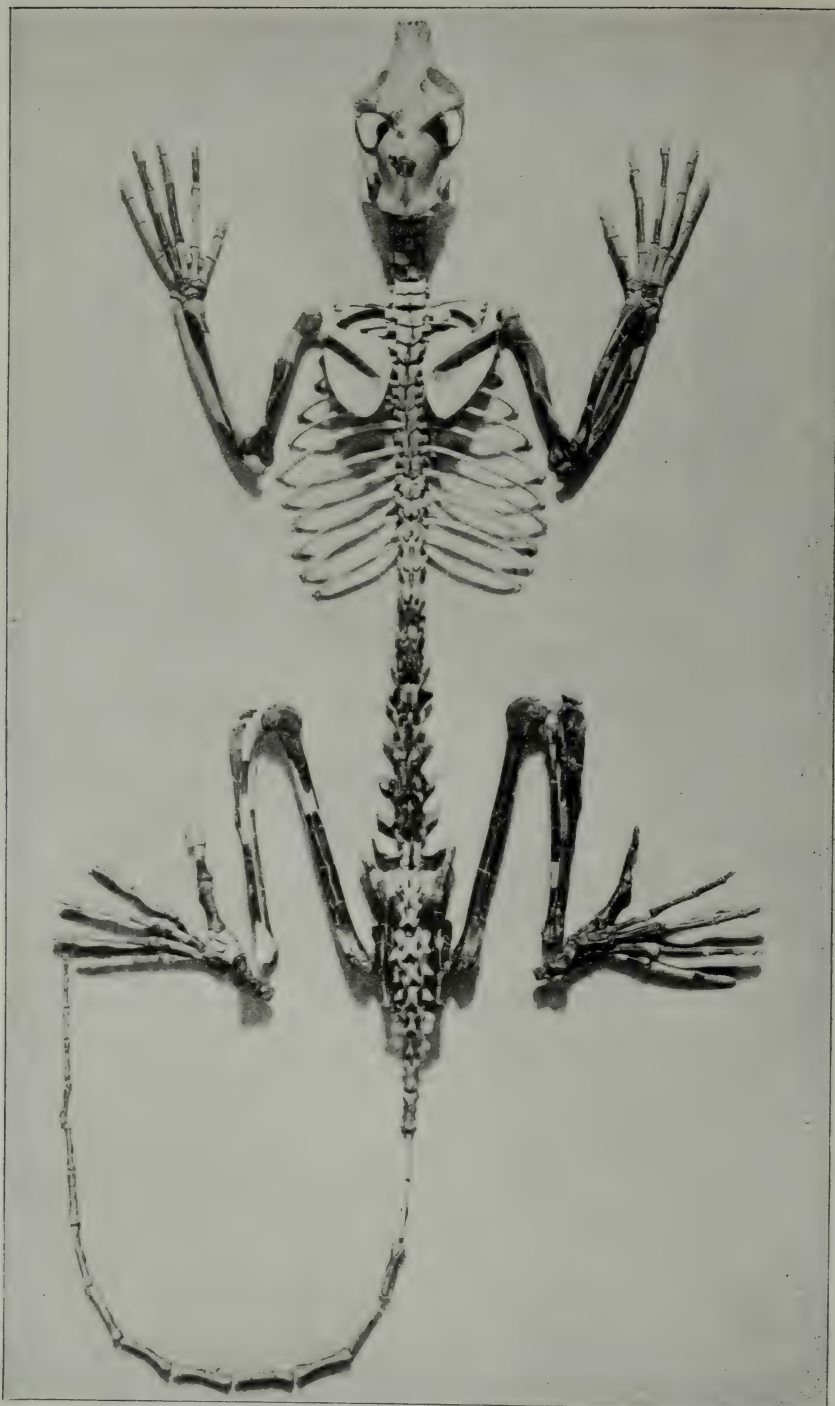
Skulls of *Tarsius spectrum* (above) and of its Lower Eocene relative *Tetonius homunculus* (below) (the latter after W. D. Matthew).  $\times 5/2$ .

even more in the young animal, these anthropoid apes in most characters are fundamentally similar to man. Now they live in the forests at the present day, and I believe that in so doing they preserve in the main the ancient heritage

anthropoid apes have not evolved as rapidly as man has. The human stock has gone on and specialized rapidly, and has taken on practically a new habitus associated with the upright position, but the anthropoids, remaining in the an-



FIG. 2.



Skeleton of a primitive fossil primate *Notharctus osborni* from the Middle Eocene of the Bridger Basin, Wyoming.  $\times 1/3$ .

cestral forests, have retained more of the ancient heritage.

For a number of years past I have been working on the general problem of the evolution and relationships of the different branches of primates, and it is my good fortune to have had put into my hands for study this priceless specimen. (Fig. 2.) It is the oldest known primate skeleton that is at all well preserved. It comes from the Middle Eocene of Wyoming, and three million years would be a very conservative estimate of its age. There is much evidence to show that this animal is fairly representative of the primate stocks of the Eocene. You see at once from the structure of the hind foot that it is an arboreal animal. The comparative anatomical evidence is very decisive that the primates were originally an arboreal stock, and this conclusion receives confirmation from the discovery from this and similar skeletons that far back in the Eocene the primates were already adapted to an arboreal life.

This is a modern lemur (Illustrating), which is a comparatively little changed survivor or relative of the Eocene lemurs. It is slightly specialized in the elongation of the limbs and in the enlargement of the brain case, but the skeleton as a whole is directly derived from that ancient Eocene type and exhibits only a very moderate change in details. Here, therefore, is an animal that has stayed in its ancestral home, and has preserved to a great degree its ancient heritage.

#### EVOLUTION OF THE HAND.

In order to show the evolutionary and structural relations of man and the other primates I have had several series of drawings made, showing parts of the skeleton in different groups of primates. Here at the left (Illustrating) is the hand of the ancient Eocene lemur *Notharctus*. Next is the hand of the modern lemur, and you see how little it has changed as compared with the Eocene type. Number three is the hand of *Cebus*, or the organ-grinder's monkey. Four is that of an Old World monkey,

a macaque. The fifth is the hand of a gorilla, and the last is the hand of a man.

The hand of the gorilla, in the majority of its characters, is much nearer to the hand of man than is that of any of the lower types. I believe that these lower types represent in a general way the progress from the Eocene stage up to the gorilla, and that the human hand has been derived from a type that would be like that of the gorilla in many but not all characters. The human hand shows some marked differences in proportion; the fingers are shorter and the thumb is better developed. On the contrary, the gorilla line has suffered a reduction of the thumb; but fundamentally the gorilla hand is of subhuman type, differing only in proportions. The hand of all primates, including man, is a fairly conservative structure, which has brought down from the earliest Eocene times the stamp of a primary arboreal adaptation.

Here is a series of humeri, representing various Eocene mammals, compared with the ascending series of primates, culminating in the anthropoids and man. I think this series bears out my assertion that at least in the form of the humerus man is nearer to the anthropoid apes than to the lower forms of primates. You will notice that in the form of the humerus this Eocene primate (*Notharctus*) is somewhat like the opossum, which is an arboreal mammal. That is, the humerus of the lower primates is adapted for a more or less quadrupedal posture, with bent elbows, and with a limited power of supinating the forearm. In the chimpanzee, on the contrary, the body is not ordinarily held in the normal quadrupedal position, and the power of supinating the forearm is highly developed. Its humerus in most respects is similar to the human type. That is, the human humerus preserves the brachiating type which is characteristic of the anthropoids. Brachiating, as defined by Professor Keith, is the habit of progressing through the trees, after the fashion of trapeze performers, raising the arms above the head and swinging

from branch to branch. Now the brachiating habit leads to the power of freely supinating the forearm which the anthropoid apes and man have highly developed. Man has therefore retained much of the brachiating type of adaptation in the hand, in the humerus and also in the radius and ulna, which I need not stop to show.

Here is a series of pelves shown in side view, the first being that of the ancient Eocene lemur *Notharctus*, next the modern lemur, then a New World monkey, and at the bottom the pelvis of an Old World monkey. The principal difference in the pelvis between *Notharctus* and the monkeys is that the latter show an expansion of the ischial tuberosity, while the ancient lemurs show but little of that character. The expansion of the ischial tuberosity is associated with the habit of sitting upright, and I believe that the acquisition of that habit was of critical importance in the evolution of all the higher primates, including man, because it finally led to the freeing of the arms so that the hands could specialize as tactile and manual organs.

This series shows the right half of the pelves of various primates, as seen obliquely from behind and above, beginning with the pelvis of the Eocene lemur *Notharctus*, and ending at the right with the human type. These early types of primate pelves are adapted for leaping in a quadrupedal fashion from branch to branch, while the higher types are adapted for brachiating and for sitting upright. As we pass toward the higher types there is a transverse expansion of the ilium, which finally in man attains an extreme development. That in turn is associated with a fully upright posture, and with the great development of the muscles which are of such importance in holding the body erect. We see this condition foreshadowed in the gorilla which can sit and stand, but not walk upright.

#### EVOLUTION OF THE FOOT.

Here is a series of drawings of the hind feet of primates, and also of the

opossum, beginning with the primitive arboreal type of the opossum, which is an exceedingly conservative animal, and passing through the higher types to the human foot at the top. Already in this Eocene primate *Notharctus* the foot was hand-like. It had a thumb-like great toe, which, as in all primates, was the dominant member of the digital series. All the lower primates are more like quadrupeds in the fact that the heel bone is directed upward, but in the chimpanzee, and especially in the gorilla, the heel-bone is directed downward as in man. In the gorilla the great toe is still turned in toward the other digit in grasping the branches of the trees; but in man it has lost the opposable power. You see also how the arching of the foot is foreshadowed in this young gorilla.

From a comparative anatomical point of view these outer four digits of man are degenerate structures. The history of the whole order shows that the primitive primates had comparatively long digits, adapted for grasping the branches. Man has long ago given up that mode of life, and we therefore find a secondary shortening of the outer four digits, a secondary lengthening of the first, or inner, digit, and a great reduction of the grasping power of the first digit. There is nothing extraordinary in that from the palæontological point of view, since it is associated with the relatively new habit of walking erect upon flat ground.

We find somewhat analogous changes in habitus in other groups of mammals. This series of the hind feet of marsupial mammals, by Bensley, shows what has happened when a certain kind of arboreal mammal, much resembling the opossum, gave up an arboreal life and took up a life upon the ground, progressing in this case by a hopping motion upon the hind feet. The fourth toe was selected for enlargement, doubtless because it was already the longest and largest in the ancestral arboreal type; and the enlargement of this digit, which finally attains an extreme size, was accompanied by an equal reduction of the other digits which finally become vestigial or entirely disappear. The series



illustrates the profound readjustment of proportion that takes place when an arboreal type is made over into a ground-living type. Thus a great change may take place in the foot with the assumption of a new habit.

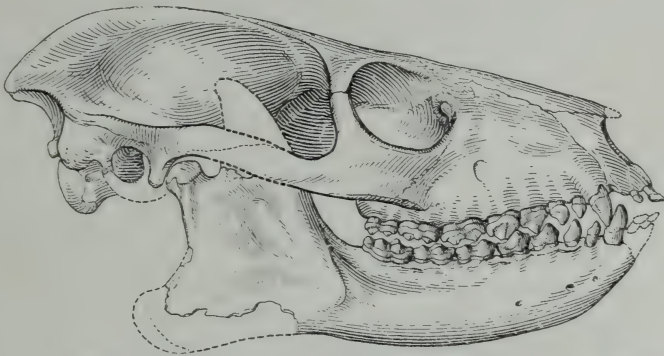
Now there were several very special reasons why in man the inner toe was preserved as the predominant digit of the foot, the foremost reason being that in the ancestral human race, as well as in all other primates, the great toe was the insertion point of a very powerful set of muscles. In this picture we see the powerful, thick tendon of the per-

and the rest of the foot has been obliterated as far as the base of the phalanges. Those are perfectly understandable modifications, and we can see an excellent reason for them in that they are all associated with a change in function of the foot from the grasping arboreal foot of the lower primates to the human type which is adapted for upright walking on the ground.

#### EVOLUTION OF THE SKULL.

In conclusion, I come to the evolution of the skull and dentition in the human

FIG. 3.



Skull of a primitive extinct primate, *Notharctus osborni*, from the Middle Eocene of the Bridger Basin, Wyoming. Natural size.

oneus longus muscle, which is attached to the proximal part of the great toe and is of the greatest use in lifting the body off the ground. The great toe was preserved and strengthened because it was the seat of this powerful muscle attachment, and Nature simply intensified this condition when man assumed the upright position. The human great toe also retains the attachment of the transverse and oblique adductor muscles which are so strongly developed in the lower primates, and which serve to prevent the spreading of the foot. They are taken over from the arboreal life and are retained almost in their full development; but the axis of the first digit has become twisted, so that it is no longer opposable to the other digits, and the gap or space between the first digit

and the rest of the foot has been obliterated as far as the base of the phalanges. Those are perfectly understandable modifications, and we can see an excellent reason for them in that they are all associated with a change in function of the foot from the grasping arboreal foot of the lower primates to the human type which is adapted for upright walking on the ground.

Here we have the skull of the primitive Eocene primate *Notharctus*. (Fig. 3.) You will observe that the orbit is nearly in the middle of the skull and that the face is correspondingly heavy, like that of a modern lemur. In the next slide I show a series of skulls, one for each family of existing primates. In the lower primates, even of today, the face is extended in front of the orbits. In the higher primates, on the contrary, we find that the face is retracted beneath the orbits. This is very well shown in the chimpanzee, and to a somewhat less extent in the gorilla. Here again the anthropoids clearly foreshadow the human condition.

In this well-known figure of Klatsch's you see the contrast between a young gorilla skull and a human skull, in

sagittal section, showing that in the gorilla we still have remnants of the condition where the face was extended in front of the orbit, while in man the face has been retracted and has grown downward, so that the lower border of the chin is opposite a lower level of the vertebral column than it is in the young gorilla.

Many other characters might be cited in which the anthropoids foreshadow man, but do not attain the extreme. They have stayed in their ancestral home in the forests, so that the pressure of the environment, or whatever it is that drives evolution from the rear, has not produced so great a change. Therefore they are conservative and give us hints as to the early conditions of our own race.

#### EVOLUTION OF THE DENTITION.

Turning now to the evolution of the dental arch and the dental formula of man, I show here the palate of a typical representative of a great number of Eocene animals belonging to different orders of placental mammals. The more primitive ones all have a dental formula on each side, both above and below, of three incisors, one canine, four premolars and three molars in the adult, and in the milk dentition 3-1-4.

The most primitive of the Eocene mammals were approaching the primitive insectivorous type, which had a dental formula of  $\frac{3, 1, 4, 3}{3, 1, 4, 3}$ , and in which

the upper dental arch was convergent in front. Here in this very primitive Eocene primate *Notharctus* we find very nearly the same dental formula and also the pointed dental arch. But the primates had lost one of the three incisors as far back as the Lower Eocene, and they have the same number that we have at the present time, namely, two on each side, above and below. These primitive primates have also four premolars and three molars, and in the milk dentition, as I know from good specimens, they have the same formula and even a similar order of re-

placement as have the more primitive primates of the present day.

This is the lower jaw, seen from the lingual side, of one of these American Eocene primates. Here are the alveoli of the two incisors, while the canines, four premolars and three molars are all in place. Thus  $\frac{2, 1, 4, 3}{2, 1, 4, 3}$  is the primitive

dental formula of the primates.

In many early primates you will find that premolars 1 and 2 are of small size, while 3 and 4 are large. This foreshadows the elimination of premolars 1 and 2, so that finally in the Old World primates you get a reduction of the formula to  $\frac{2, 1, 2, 3}{2, 1, 2, 3}$ . Here in this an-

cient type from the Lower Oligocene of Egypt you find this formula of 2, 1, 2, 3, because the first two of the premolars have been eliminated. Professor Bolk, basing his conclusions partly on the variations of the dentition in man, comes to an entirely different conclusion as to the derivation of the dental formula of man, but from the palæontological viewpoint it is highly probable that the main stages of the evolution of the human dental formula were as follows:

First stage, primitive insectivorous mammals of the Paleocene: dental formula of adult,  $\frac{3, 1, 4, 3}{3, 1, 4, 3}$ .

Second stage, primitive primates of the Lower Eocene: formula,  $\frac{2, 1, 4, 3}{2, 1, 4, 3}$ .

Third stage, primitive Old World primates of the Lower Oligocene: formula,  $\frac{2, 1, 2, 3}{2, 1, 2, 3}$ , persisting in paleolithic

human stages (Heidelberg, Neanderthal, etc.), and in all primitive existing human races, as well as in all the anthropoids and Old World monkeys.

Fourth stage, partly degenerate modern human stage, with delayed or suppressed third molar teeth: formula,  $\frac{2, 1, 2, 2}{2, 1, 2, 2}$ .

If the lateral incisors should ever be crowded out, as has happened in certain

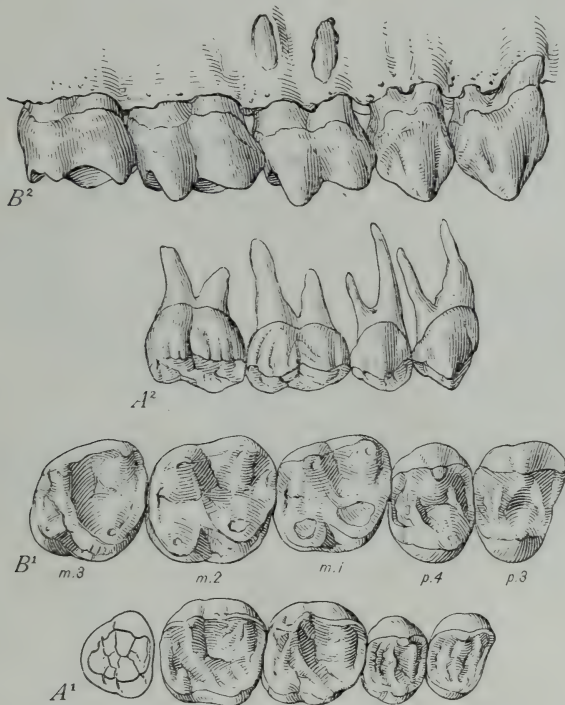
extinct primates, the human formula would fall to  $\frac{1, 1, 2, 2}{1, 1, 2, 2}$ .

Even in the earliest Tertiary primates of Egypt, as well as in all the later Old World series, we always have this dental formula of  $\frac{2, 1, 2, 3}{2, 1, 2, 3}$ . It is the primitive heritage of this whole series, which man largely retains. Sometimes an

in this side the dental arches of the Piltdown man, as restored by Smith Woodward, secondly of the Talgai man, and thirdly of a modern Englishman. It shows the palate of this modern white man quite inside of these ancient big-jawed types.

The general drift of this line of argument is that there have been two processes: first a reduction of the front

FIG. 4.



Comparison of upper cheek teeth of *Dryopithecus punjalicus* (A¹, A²—(after Pilgrim)) and Gorilla (B¹, B²).  $\times 1/1$ .

extra molar is added, but that is an abnormal both in the anthropoids and man, and has nothing to do with the original condition.

This is a skull of a fossil man found at Talgai, Australia, recently described by Dr. Stewart Smith. It is evident that this was a very prognathous type, with an extremely wide palate and very large canine teeth. Dr. Smith shows

part of the palate correlated with the general retraction of the face, and secondly, a readjustment and shifting of the lower canine tooth so that now it normally lies inside of the upper canine instead of outside and in front of it, as it does in all lower primates. From a study of the facets on the upper canine of the Talgai skull, Dr. Smith infers that the lower canine occluded in front



of the upper, as it should do in such a very primitive human stage.

The relative nearness of man to the anthropoids is also indicated by a comparison of the premolars and molars. Fig. 4 shows the upper molars of a modern gorilla and those of an extinct related genus. You can see that the patterns of the upper molars in both is fundamentally similar to the human pattern, and you can readily homologize these cusps with the corresponding ones

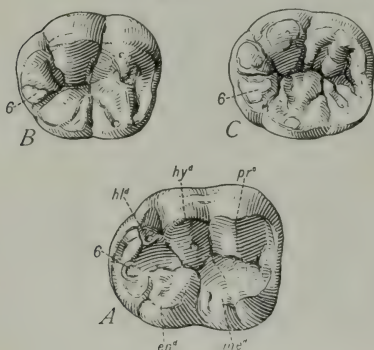
apparent in many human teeth. Also these ancient types have the bicuspids with the parts found in the human bicuspids, only the anterior lower premolar in the anthropoids is more developed, while in man it is more degenerate and reduced.

Here again the human dentition, in spite of its great changes in adaptation to human life habits, carries traces of its ancient anthropoid heritage.

The thought that I would emphasize in conclusion, as illustrated in the figure of a young gorilla (Fig. 6), is that the anthropoids retain in many respects the common man-anthropoid heritage, which has been more largely lost or obliterated in man.

Although I have naturally been unable to present or discuss the evidence for the views on evolution just outlined, yet I hope I have made clear my conviction that human evolution can best be considered after some general concept has been acquired as to the scope and method of evolution as a whole. Whatever may be the explanation of evolution,—and the modern work in genetics and cytology makes a final explanation seem more difficult than ever,—yet the *facts*, or some of them, may be clearly perceived, especially in the light of modern palæontological studies on the history of various races of mammals. From these we learn some of the very simple ways in which evolution actually takes place, namely, through differential change of proportions, the reduction in number and loss of parts, etc.; while in the same series we can also see clearly that such changes in certain parts have accompanied either an intensification of function or a change of function, or both together, and that the process often leads to profound transformations, to over-specialization and eventually to extinction. And I hope I have suggested that in order to decipher the evolutionary history of man it is necessary to study that of all the other primates. Dentists are often tempted to base far-reaching theories as to the derivation of the human dentition on their observa-

FIG. 5.



Anthropoid heritage in the lower molar pattern of Man. A. *Dryopithecus chinjiensis*. Upper Miocene, India. Left  $m_3$  (After Pilgrim). B. *Homo sapiens*. Left  $m_1$ , from the mandible of an Indian child. C. *Homo sapiens*. Left  $m_1$  of an adult Australian black (♀).

in man. So also in the premolars, they foreshadow the human type, although different in details.

Fig. 5 shows the crown views of several lower teeth that bring out well the anthropoid heritage in human lower teeth. This middle one is an ancient anthropoid type, *Dryopithecus*, from India. You have on the buccal side three main cusps, and on the lingual side two main cusps, and you have these peculiar furrows, which are particularly well shown in this human tooth. (Fig. 5B.) This I have called the *Dryopithecus* pattern because it was best shown in that genus. A modified form of that pattern is very

tions of abnormal variations, and to make superficial and misleading comparison of man, we must study first that of

FIG. 6.



Photograph of a young gorilla, "Dinah."—By permission of the New York Zoölogical Society.

parisons with the conditions in existing primates, but many times this has led to illusory or even absurd results. In

the mammals, especially those of the great Eocene epoch.

77TH ST. AND CENTRAL PARK, WEST.

# The Significance of Pulpless Teeth in Health and Disease.

By **BERTRAM B. MACHAT, D.D.S., Brooklyn, N. Y.**

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(Read before the Tricounty Dental Society, Newton, N. Y., April 1919.)

**I**T is the purpose of this article to present some conclusions arrived at by my associates and myself in the course of our investigations relative to the responsibility of devitalized and pulpless teeth in the causation of disease in general, with some suggestions for their disposition.

Before proceeding with this subject it may not be out of place to deliberate upon the public's attitude toward the dentist today.

As a professional man, it appears to me that none offers more and receives less in return for his arduous labors than does the dentist. He gives his best years to his profession, works incessantly, seeks to attain a high moral and professional standing and, despite all his honest efforts, his service relative to pulpless teeth is too frequently criticized and condemned.

Wherein is the dentist wrong and who is at fault?

The answer may be ascribed to the chaotic state in which the profession of dentistry has been thrown, due to the revelations concerning the pathogenicity of pulpless teeth. The standpoint attitude of the general practitioner on the proposition that all is well so long as the tooth is free from pain and, on the contrary, the warning of oral pathologists against such unwarranted optimism, have finally reached the lay mind, with the result that in the event of systemic trouble the layman is only too prone to fix the blame on the dentist. Logically, however, practices of many decades cannot be changed in a day. The readjustment is a matter

of progress, which will be accelerated in direct proportion to the strength of the evidence warranting the sweeping changes that the dental practitioner is called upon to make.

Pathologists tell us that most disease is attributable directly and indirectly to infection. By this term, according to Hewlett, "we understand the entrance into the living tissues of pathogenic micro-organisms which grow and multiply at the expense of the host." Of the many different varieties of pathogenic bacteria none play so important a rôle as the coccus group and of this the streptococcus is the most prevalent and most commonly associated with mortality.

For years we have been told, taught, and warned by those in authority, that the mouth is the most common port of entry of infection, that streptococci abound in the mouth and that, while under normal conditions they may here remain harmless, an altogether serious consideration arises upon the transmission of the bacteria or their toxins into the circulation and deep tissues.

To what extent the practice of dentistry may be responsible for the introduction of streptococci or their toxins into the body is, unfortunately, not yet fully appreciated.

At this point I wish to go on record as saying that devitalized\* and pulpless

\* By this term we refer to that which is generally understood, a tooth containing a partially or wholly devitalized pulp. Strictly speaking, however, a devitalized or dead tooth is devoid of circulation, both intra- and extra-dentally.



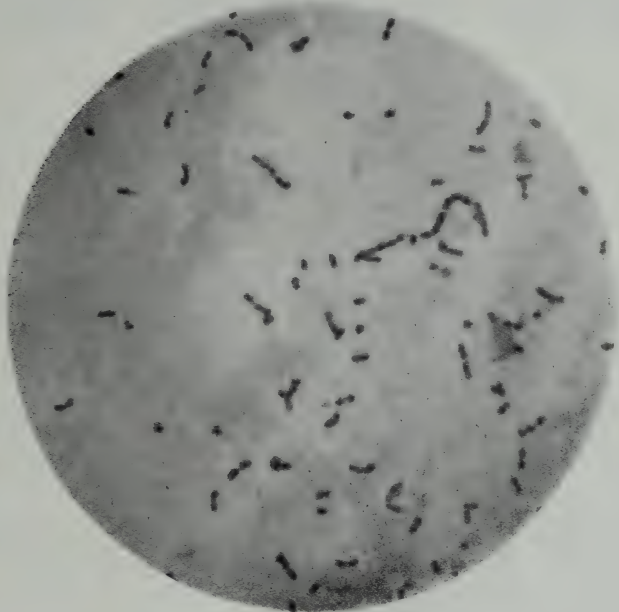
teeth do cause incalculable systemic disease, much suffering and not infrequently are the etiological factors of very grave results. Radical as this statement may sound it is, nevertheless, the only reasonable conclusion that one may draw from an intensive study of this problem and especially from experience that is peculiar to my specialty.

Since so much diverse opinion and consequent confusion exists among den-

has been my opportunity to observe the menace of mouth sepsis. Patients long bedridden are not infrequently discharged shortly after the removal of pulpless teeth.

*Second.* From the pathological examination of non-vital teeth. In our own laboratory as well as in the pathological laboratories of the hospitals with which I am associated, suspected and extracted teeth are examined and almost

FIG. 1.



Pure culture streptococcus viridans, taken from a root apex of a tooth containing a good root-filling and radiographically negative as to apical pathology.

tists regarding this all-important subject, I shall endeavor to give a short sketch of the manner in which our data is obtained.

*First.* From the study and treatment of many hundreds of patients in the wards of three hospitals, where a properly recorded anamnesis, together with the reports of other specialists, is available; where team work between the internist and the oral specialist is at its best; where, regardless of the clinical manifestations of the case, the rehabilitation of the patient is paramount; here

invariably our findings are streptococcus positive.

A differential study of approximately 1000 teeth reveals several points of interest:

(a) Mixed coccus infection is usually found in connection with cases of extensive apical involvements.

(b) Devitalized teeth with negative radiographic findings commonly yield a pure streptococcus. (See Fig. 1.)

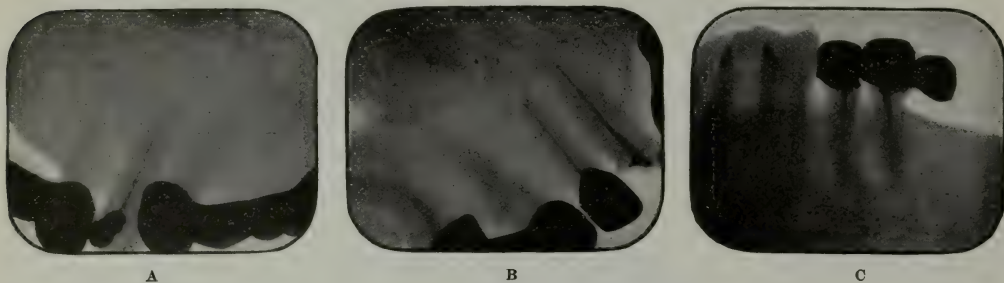
(c) When specimens from several teeth of one patient were cultured, sim-

ilar morphological grouping was found in all.

(d) In a few instances the same organism was recovered from the blood.

here deals chiefly with the localization and eradication of dento-apical infection. A strong point in connection with this is, that the most striking recoveries have

FIG. 2.



(e) The presence of rods and spirilla on the microscopic slide is evidence of contamination. Such findings, however, are rejected.

FIG. 3.



followed the removal of pulpless teeth apparently free from apical involvement. (See Case Histories: Case I, Fig. 2 A, B, C. Case II, Fig. 3.) The added advantage of keeping in touch with the patient for a considerable period is particularly illuminating as to the ultimate result of eradication treatment, while the percentage of cases that are restored to health is fairly astounding. However, allowance must be made for the fact that patients are referred to us generally by physicians, and it is reasonable to assume that all other probable causes have been previously ruled out, hence the greater the percentage of success. Again, the effect of such work is to redouble our efforts in the zealous search for and careful elimination of oral sepsis.

#### PULPLESS TEETH.

For years the controversy upon the problem of pulpless teeth has held the center of the dental stage. Hardly could an appreciable group of dentists be found in agreement on that subject. However, the real issue, *viz.*, the pathogenicity of the apical area and the grave danger of a streptococcus infection was lost sight of by the hair-splitting arguments over root-filling and root-filling materials. Great stress is laid upon the radiographic film as the deciding factor in the controversy. A negative apical field following a root-filling is generally accepted as

*Third.* In private practice we are called upon to treat sick people only. Here we deal with the chronic, ambulant patients rather than the acute cases. We find that their complaints spare but few departments of medicine. Our work

a successful operation, while the more enlightened dentist will demur at the sight of a dark area over the apex of a filled root as seen in the X-ray film at some future time. And since neither of these phases has been proved to be free from infection, is there any wonder that the conscientious men in the ranks of our profession are perplexed over the whole problem? The argument that patients enjoy apparently good health despite their devitalized teeth, is both true and untrue. There are two factors to be considered:

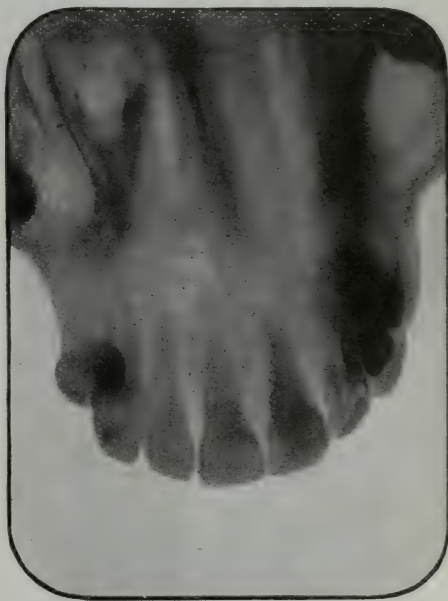
*First.* Resistance or immunity which can only be considered in a relative sense. The patient is well as long as the bacteria gain no ascendancy over the natural resistance.

*Second.* It is usually during the innocuous period that the general practitioner of dentistry has occasion to see the patient.

When, however, the bacteria gain ascendancy over the natural resistive forces, the individual becomes a patient of the physician. His complaint may only be a cold, a deranged gastro-intestinal apparatus, a spondylitis, or a nephritis, yet the apparently harmless tooth may prove to be the source of that hematogenous-born lesion, and as is commonly the case the dentist is none the wiser. (See Case Histories: Case III, Fig. 4.) Sometimes the physician will call in the family dentist for an opinion, only to be met with the positive assertion that the teeth are all right. Such cases may linger indefinitely until a consulting dentist will point to the devitalized teeth with positive recommendations for their removal. Naturally, where recovery or improvement follows the eradication of infected teeth, the family dentist stands discredited. The unnecessary and ill-advised responsibility that the dentist takes in ruling out the mouth despite the knowledge of the existence of pulpless teeth is inexplicable, except on the ground that he is not conscious or convinced of the gravity of the situation. (See Case Histories: Case IV, Fig. 5 A, B, C, D, E.)

Far better co-operation would be in the presentation of the facts in connection with the mouth findings to the physician, to leave the prognostication of the suspected focus to his judgment. It may be well to point out to the physician the importance of conserving the tooth in question, especially where its artificial replacement would be difficult or impossible. But in the last analysis we should remember that the physician is respon-

FIG. 4.



sible for the health of the patient, and, therefore, he alone must pass on the significance of the case.

Lest an impression be created that the writer advocates the removal of all devitalized and pulpless teeth, it must be emphasized that I have no such hard and fast rule. In a general way it must be stated that in the consideration of a pulpless tooth which plays no important function or one that can be artificially restored without the mutilation of other sound teeth,\* it is marked for extrac-

\* See Discussion of Dr. Ward's paper by the author in the DENTAL COSMOS, Dec. 1919, p. 1245.

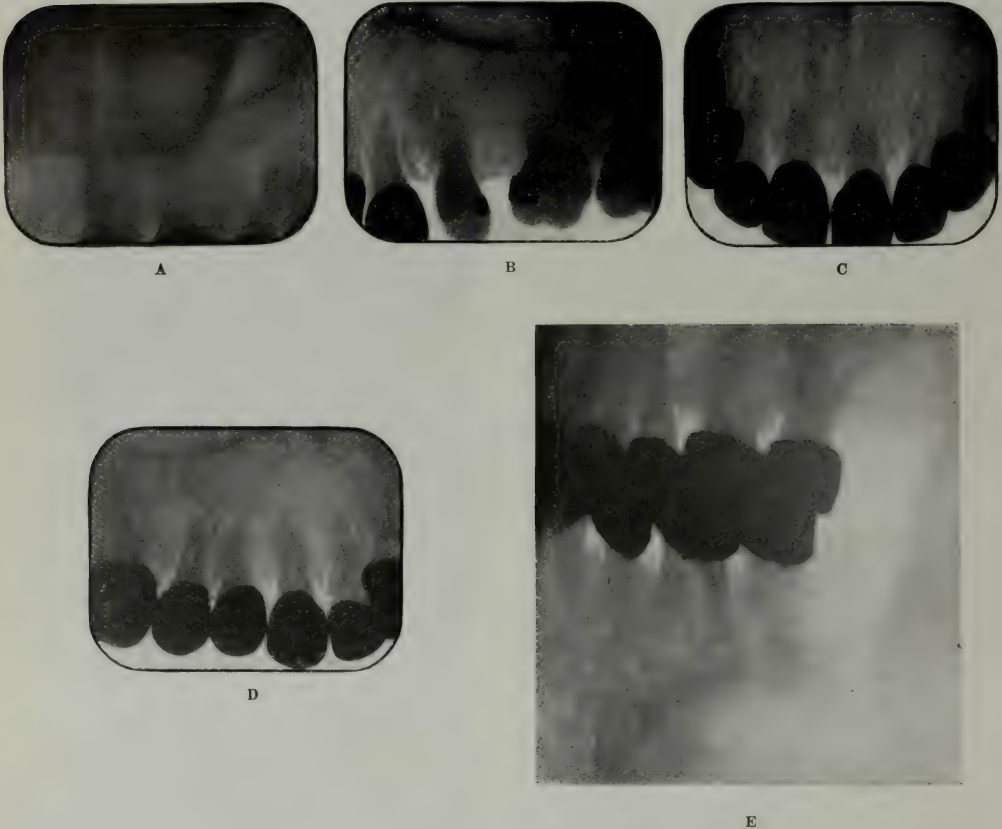


tion. On the other hand, devitalized teeth that are absolutely indispensable are subject to a close analytical study such as, (1) local pathology; (2) probable systemic effect; (3) general physical condition of the patient; (4) position of the tooth in the mouth; (5) sex; (6) age; (7) occupation; (8) num-

#### ROOT RESECTION.

Multi-rooted teeth, because of their position and their multiplicity of infectious foci, have a poor prognosis. Surgically it is possible to conserve these by root resection, yet practically such operation should generally be limited to the

FIG. 5.



ber and outline of roots; (9) prospect of restoration; (10) value as an abutment; (11) occlusal function, etc.

Such teeth may be retained but not until consultation with the physician and pathologist assure us of the absence of a strepto-toxemia and then only after careful re-opening, sterilization, ionization, refilling and often resection of the apical third. (See Case Histories: Case V, Fig. 6A, B, C; Case VI, Fig. 7.)

anterior group. Unfortunately, there is not sufficient evidence available to warrant the statement that even well-filled and resected roots are free from infection. Patients who have undergone such operations are not easily persuaded to give up those teeth. We have examined a small number of extracted previously resected teeth whose periapical areas showed regeneration of bone, and we obtained negative results in some, while

others yielded cocci. Some years ago the writer publicly stated that on no account would he retain previously devitalized upper molars in the mouth of an individual with a low resistance. The incidence of maxillary sinusitis traceable directly to infected teeth is becoming more pronounced as we go on with our work, and hence we feel that our position is correct in this respect.

normal to alarmingly high blood pressure. However, the latter cases are generally complicated by suppurative mouth lesions. A differential blood count frequently reveals a lymphocytosis in the former, while a leucocytosis is more often seen in connection with the latter variety.

In the consideration of the elimination of a tooth the question of restoration is admittedly an important phase. This

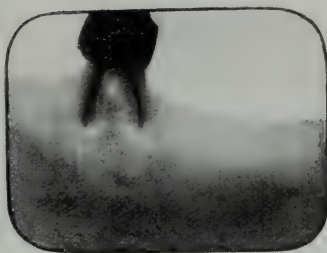
FIG. 6.



A



B



C

Great significance should be attached to the blood picture and blood pressure before attempting the conservation of devitalized teeth. Our studies in regard to this have shown a striking relationship between mouth sepsis and hem-analysis. Ninety per cent of the patients with closed streptococcal foci present an abnormally low blood pressure, low hemoglobin index and deficient red and white cells. The other 10 per cent. vary from

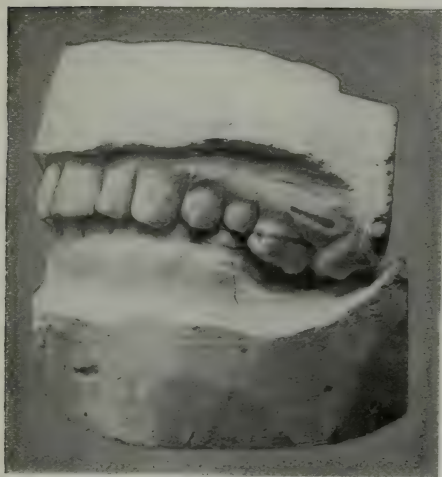
objection to a great extent has been removed, however, to our satisfaction.

Where all objectionable features have been eliminated and root treatment is contemplated, one should bear in mind the path of and the local conditions that favor dento-apical infection. Apical infection will be transmitted, (a) by deep-seated caries; (b) by septic instrumentation; (c) by way of a sinus leading up the side of the root or from the

gingival surface; (*d*) by contiguity from adjacent foci; (*e*) by circulation.

Bacteriologists tell us that for infection to be successful there must be a

FIG. 7.



favorable nidus. Nowhere in the body are conditions more ideal for focal infection than at root apices. Here we have warmth, moisture, pabulum, darkness, lack of drainage, etc. Since dentists are

uriant growth will occur in from 24 to 48 hours; frequently in less time than that.

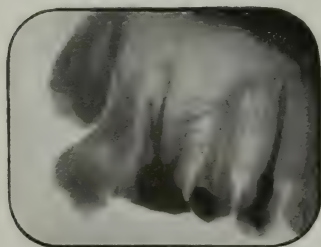
Before proceeding with a root-canal operation, thorough sterilization of the tooth surface, cavity and pulp contents is imperative. The further treatment presupposes isolation of the field under the rubber dam and the maintenance of surgical asepsis throughout the operation.

While in the light of our present knowledge, the unwarranted removal of a normal pulp is to be condemned, yet we realize that there are *rare* cases when such procedure is unavoidable. (See Case Histories: Case VII, Fig. 8A, B.) Emergencies of this nature are treated as a surgical procedure. The removal of a pulp (under conduction anesthesia) curettage and root-filling is carried out in one operation.

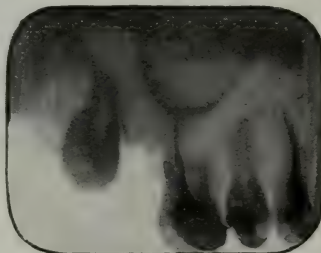
#### TECHNIQUE OF PULP EXTIRPATION.

Complete pulp extirpation is more successfully accomplished by carrying the hook or barbed broach to the apex before attempting to dislodge the pulp. At this point a slight turn will disengage the nerve branch and frequently carry with it the entire contents. Where the latter fails to come away in its entirety

FIG. 8.



A



B

A. Immediately after root operation; no pain followed. B. After removal of molar and resection of alveolus.

concerned mainly with streptococci, it is of interest to know that these organisms propagate very rapidly. One may best observe this by culturing on artificial media. On agar and in bouillon a lux-

it can be followed up with barbed broaches of heavier caliber. In curetting the canal both metallic sodium and potassium and sulfuric acid are found helpful. It is our practice to remove all



organic substance first with the former. The canal is then washed with  $H_2O_2$  and saline, and enlargement of the canal is continued with 50 per cent. of  $H_2SO_4$ . Avoid carrying either of these medicaments beyond the apex. Dry curetting of this zone is the safest. This is usually accomplished after the neutralization of the  $H_2SO_4$ . The canal is now again washed with saline, dried with Johnson

bacteriologic technique to obtain a supply of glucose bouillon tubes and keep them (upright) ready at hand in a cool place. When ready to inoculate, flame the cotton stopper and remove the previously sealed-in root-canal drying point, then attach it to an electric light bulb or place it anywhere in an upright position, provided the temperature does not run above  $100^\circ$  nor below  $95^\circ F.$  Observe after 24

FIG. 9.



Preparation of the patient and armamentarium for ionization; root therapy.

& Johnson's dressing points and the last sterile point is left therein and the pulp chamber packed with, *first*, flamed cotton, *second*, flamed gutta-percha, and sealed with oxychlorid of zinc. The patient is then dismissed for 48 hours, at the end of which period under strictest asepsis the cavity contents are removed, while the drying point previously placed in the canal is now dropped in clear bouillon and incubated. (See Figs. 9, 10.)

For the sake of simplicity I recommend those not equipped or familiar with

to 48 hours, shake the tube, and if the media is found turbid, it is an indication that a growth has taken place. Where contamination can be ruled out, a streptococcus will generally be found. This is usually true of long-standing apical infections. Where sodium and potassium and sulfuric acid have failed to effect sterilization, what hope may we have in any drug? And so where treatment in this manner failed to sterilize, the root is ionized, dried and again redressed with J. & J. points and sealed. This bacteriological cycle is repeated at

intervals of 48 hours until a negative bacteriological finding is reached, when the root is ready to be filled.

#### IONIZATION.

Dr. Hermann Prinz has experimented extensively with ionization with gratifying results. In our hands, ionization has

tooth (molar) after seventeen treatments. However, it led to the adoption of a definite routine. Where three ionization treatments fail to clear up the root, it is followed by immediate filling and resection, cauterization and sealing of the amputated end with amalgam.\*

Our method of root filling follows the teachings of Callahan. We believe that

FIG. 10.



Taking culture specimen from root-canal two days after ionization.

so far been the only hope, even though this is not always successful. One may ask, How many times is it necessary to ionize a root-canal to effect sterilization? There is no definite rule. We have obtained a negative culture after one ionic treatment. And, on the other hand, during our experiments with ionization we failed of success in the case of one

in the hands of most practitioners this method is safest, sanest, and quickest. Chloro-resin is carried into the canal either with a fine pipet or the beaks of fine tweezers; a large gutta-percha point is soaked in the resin-fluid and gently

\* Paper on the author's technique of root amputation appearing elsewhere.

carried into the canal as far as it will go without interference; it is then worked up and down with a pump-like motion until the entire mass is driven home. Often the very largest point will when so introduced fail to fill the entire canal. More resin and more points may be added until the upper half or two-thirds of the canal is completely sealed. Disregard the surplus that escapes beyond an apical end. (See Fig. 11.) Provided the gutta-percha and chloro-percha are sterile and no hard point has been projected beyond the apex to an extent where it may act as a permanent irritant to the highly sensitized tissue,

he who claims to fill roots *to* the apex only rarely fills them; and he, who claims that he *never* fills beyond the apex, does fill beyond the apex.

Summarizing, we say, that every devitalized tooth should be looked upon as a potential focus for the dissemination of systemic infection; that the ruling out of such a tooth presupposes reasonable proof that it is free from disease; that promiscuous devitalization of normal pulps is to be condemned; that in rare cases, where the conservation of a devitalized tooth is indicated, surgical asepsis and preferably an operation completed in one sitting is the safest plan.

FIG. 11.



Bicuspid treated, eurented and filled, one operation; note encapsulation. No pain or post-operative symptoms.

post-operative complications are rare. This is my conclusion after years of observation and careful checking-up of patients whose root-canals were over-filled.

Root-canal surgery is essentially an operation of deftness and skill, hence the operator should be capable of differentiating between gentle pressure and trauma. When the Callahan method of root-filling is resorted to, surplus gutta-percha will be expressed out beyond the apex in proportion to the existing periapical resorption. Under these circumstances filling in of the area and encapsulation of the root apex is desirable. Incidentally, this surplus becomes an excellent guide to further prognostication. I have given much thought to the denunciation and the denunciators of root-end encapsulation. It appears that

#### CASE HISTORIES.

CASE I: Fig. 2 A, B, C. Mrs. M., age fifty, H. W., complained of polyarticular arthritis, gastro-intestinal trouble, headache, lassitude, etc.; for many years under medical care.

Mouth examination revealed several devitalized teeth which, however, showed no apical osteoporosis (see Fig. 2 A, B, C). Incidentally an evidence adduced elsewhere of the innocuousness (?) of these teeth. Bacteriologic examination of the root apices yielded, without exception, a pure field of a short chain streptococci. Now after two years and six months patient's health is excellent.

CASE II: Fig. 3. Mrs. W., age thirty-six, married, H. W. Complained of vertigo, headache, lassitude, trouble of vision, etc. Previous history, Wassermann and urinalysis negative. Blood picture showed secondary anemia. Blood pressure: systolic, 96; diastolic, 66.

Mouth examination showed general sepsis: both maxillary centrals, lateral incisor, and cuspid devitalized; no periapical involvement. Right bicuspid area (under bridge) probably old granuloma (see Fig. 3). These teeth upon cultural examination proved streptococcus positive (see Fig. 1). Prompt recovery followed the general cleaning up of the mouth.

CASE III: Fig. 4. Mr. J. H., age forty, merchant. Previous personal and family history negative. Suddenly taken ill; high temperature. Careful medical examination, serological, immunological, and repeated urinalysis tests proved negative. Tonsils slightly enlarged but of no pathological significance. Intestinal contents negative. Dentist and radiologist who examined the mouth found



nothing noteworthy and so the patient lingered for many weeks with a high septic temperature. Blood count constantly showing a leucocytosis, yet no tangible lesion was localized. At this point the writer was called in for consultation.

Mouth examination revealed a fairly well-kept mouth free from artificial appliances, well-shaped arches and teeth in good occlusion. Periodontoclasia, purulent in the molar regions, with slight mobility of the molar teeth; few metallic fillings and a discolored right upper bicuspid were noted upon general inspection. Percussion revealed the mandibular molars and the four maxillary incisors muffled. Electro-diagnostic test (see "Dental Electro-Diagnosis," by the writer, DENTAL COSMOS, Feb. 1919) revealed the four maxillary incisors and the right maxillary cuspid and bicuspid and the right mandibular first and second molars minus. Radiographic examination: Excellent root-fillings in the right maxillary cuspid and bicuspid; partial root-filling in the molars, no evidence of intradental interference of the incisor teeth. A large osteoporosis area, indicative of extensive necrosis over the central incisors, was revealed. Interrogation concerning trauma of this part recalled to the patient a fall which he suffered some years ago, but paid no attention to the swelling at that time, which passed off gradually and was never painful. It must be pointed out that these four teeth were in no way discolored, mechanically and surgically undisturbed, had no caries, and were in good occlusion. I operated upon the jaw Dec. 22, 1918. The patient did well for several days, when the temperature again shot up to 106. At this time he also complained of severe pain in the region of the left kidney. The latter was diagnosed by the general surgeon as a perinephric abscess, for which the patient was operated on. Recovery followed somewhat slowly but surely, and at the time of this report the patient is fully recovered. Regained 52 pounds of weight, which he had lost during the illness.

The consensus of opinion of the several specialists who treated this case was that the perinephric abscess was the metastatic result of the maxillary lesion.

CASE IV: Fig. 5 A, B. Mrs. J. A., age thirty-nine, married, four children, H. W. Complained of subacute arthritis especially affecting knee joints, sick headache, conjunctivitis. History: About one and one-half years before the patient consulted me, "was taken acutely ill with pain of the limbs,

which swelled at the knee joints, had nausea and headache, was confined to bed about three weeks." "Relapse occurred about one year after that which again confined the patient about seven weeks." At the time of the consultation patient walked with great difficulty, eyelids were swollen, joints of fingers were enlarged, etc.

Mouth examination revealed fifteen gold caps and bridges, mal- and traumatic occlusion, highly engorged gingivæ, no sinuses, no pus anywhere. First electro-diagnostic test showed all uncrowned teeth plus to index of 60. X-ray examination (see Fig. 5 A, B) showed partial root-filling in several of the crowned teeth, but no apical pathology was noted. Crowns were removed and second electro-diagnostic test revealed the right maxillary 2, 4, 5, 6, the left maxillary 2, 3, 4, 7, 8, the left mandibular 3, 4, 5, 6, 7, and the right mandibular 7 devitalized. Hemanalysis: Hemoglobin, 80%; red blood corpuscles, 4,200,000; white blood corpuscles, 5000; lymphocytes, small, 45; lymphocytes, large, 5; leucocytes, 47; eosinophiles, 2.

Bacteriologic examination of smears taken from root apices (post extraction) yielded mixed cocci from left mandibular 5, 6, 7, and right mandibular 7, while all the other devitalized teeth which were extracted were found to contain a pure organism of a short chain coccus.

Patient reports regularly (coming a distance of over two hundred miles) feeling fine; "had chains removed from her feet," etc., now three years.

CASE V: Fig. 6 A, B, C. Case of chronic arthritis: A, before treatment; B, roots filled and amputated; C, eighteen months after operation.

CASE VI: Fig. 7. Young woman, general health fair; complains of pressure in the anterior nasal region. Rhinological examination negative. Conservation of both centrals here imperative. The picture indicates two methods of accomplishing same. Right central incisors refractive to ionization. Resection of apical third followed. Left central on the other hand proved steadily sterile after the second ionization.

CASE VII: Fig. 8 A, B. Miss I. P., age twenty-two. Illustrates a case where devitalization was unavoidable. Medical history negative. Following an operation some two years before, at which time all the left mandibular molars, including a transversely impacted third molar, were removed, the left maxillary first and second molars grew down

to a point where they occluded and traumatized the gingivæ in the mandible; thus not only precluding the possibility of artificial restoration but also endangering the health of the patient. Trimming of the occlusal third of these teeth was found impractical owing to the extreme sensitiveness of the teeth; besides, sufficient space could thereby not be afforded for an artificial appliance. Accordingly conduction anesthesia (tuberosity and posterior palatine) was given and the pulp and branches from the first molar removed, roots curetted and filled (see Fig. 8 A). This was all accomplished in one

operation. Two weeks later the second molar was removed and the alveolar walls resected both buccally and palatally, thereby lengthening the previously cut down first molar and exposing part of the crown of the unerupted impacted third molar. This case is not yet completed, but it is my plan to carry that tooth forward by means of an orthodontic appliance to the place of the second molar (see Fig. 8 B). It will be noted that sufficient space has thus been created for all purposes.

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## Why "Pulling" Teeth Fails.

A Plea for Their Surgical Removal When Evulsion of These Organs is Indicated by Infection.

By ROBERT BURNS, Jr., D.D.S., San Francisco, Calif.

(An address delivered before the Alameda County Dental Society, November 5, 1919.)

**T**HIS paper is a plea for what has come to be known as the surgical removal of teeth whenever the evulsion of these organs is indicated, either by reason of pyorrhea, abscesses, or in any condition where infection is present about the root or in the periapical tissue. An attempt will be made to prove that in the presence of the aforementioned conditions the ordinary "pulling" of teeth offers but scant hope for the entire removal of the infection. Moreover, any attempts at curetment in the sockets so remaining will, in the great majority of cases, not only absolutely fail of their purpose but actually do more harm than good, because all the chances are against a proper removal of the focus and rather more likely to stir up the infection with the resultant exacerbation of a variety of systemic ills more or less harmful and certainly very unpleasant for the patient.

No dead or devitalized tooth should ever be merely "pulled." In every instance involving a dead tooth where for whatsoever reason removal has been decided upon, surgical removal should always be the method of choice.

These statements are based upon an acceptance of the fact that dead or devitalized teeth, abscessed teeth, or teeth badly infected with pyorrhea are in an alarmingly large percentage of cases foci of infection, the proper removal of which is a matter of very serious import. This fact has been so clearly proved by the work of Billings<sup>(1)</sup>, Hartzell<sup>(2)</sup>, Rosenow<sup>(3)</sup>, and others that it seems hardly worth while mentioning further.

One reason why so many medical men and a still greater number of dentists put too much faith in the "treatment" of root-canals for the cure of abscesses and the removal of infection, is that they fail to grasp the fact that every tooth



in which the pulp has died or been removed at once becomes in every sense of the word a "dead" tooth. The dentin, being composed of about 28 per cent. organic matter from which all blood supply has been removed, can necessarily do nothing else sooner or later than become infected.

Noyes<sup>(4)</sup> says: "The vital function of the pulp is the formation of dentin and is performed by the layer of odontoblasts. These cells also, by means of their dentinal fibrils, maintain the same relation to the dentin matrix that the bone and the cement corpuscles bear to the matrix of bone and cementum. When the pulp is removed from a tooth, its dentin becomes dead dentin in the same sense that bone in which the bone corpuscles have been killed is necrosed bone." Black and Hopewell-Smith are in accord with this statement, as, indeed, are practically all dental histologists.

Dead bone can and will form a sequestrum that may be exfoliated. Not so with dead tooth dentin, for it is closely held in place by the surrounding cementum, the vitality of which is maintained by the pericementum whence it draws its blood supply. This, however, will not prevent, as Noyes<sup>(5)</sup> has shown, the toxic products from the dead dentin or the live bacteria getting into the lymph channels and into the blood stream. Furthermore, if the enveloping pericementum is removed or becomes infected there is absolutely no hope of cure, either spontaneously or with the assistance of medication; for the cementum is not like bone. It has no Haversian system; it is not vascular; it cannot form a sequestrum; it cannot heal itself.

Arthur Black<sup>(6)</sup> referring to pyorrheal as well as apical involvements says: "The suppurative detachments of the peridental membrane are in practically all cases permanent detachments whether the detachment is at the side of the root or the apex."

Wherefore, when the cementum loses its pericemental attachment and becomes infected, the only hope is complete removal by surgical interference.

These facts are accepted as basic and

beyond question by dental histologists. Upon what theory, then, is based the hope of "saving dead teeth"? And let us see if the hope has even a reasonable chance of success.

Firstly, it is agreed that every particle of pulp tissue in the root-canal must be completely removed under aseptic care. Secondly, the ends of the dentinal tubuli must be thoroughly sealed against bacterial invasion and the root apex similarly sealed. In passing, it would be interesting to know what percentage of root-canal operations in the average dental office are performed under surgical asepsis.

If for the sake of argument we grant that it is physically possible to remove all debris from a capillary tube with multiple apical foramina, there still remains the impossibility of sealing the tubuli and the root apex. Dr. Weston A. Price<sup>(7)</sup> of the National Dental Research Department conducted a series of experiments to determine this very point. He asserts as a result of these experiments: "It is therefore, a physical impossibility to completely fill a pulp chamber with gutta-percha made plastic by any of the above solvents" (referring in detail to the various solvents commonly used in dentistry for the purpose) "except at the time the gutta-percha contains the solvent." His experiments further proved that immediately after the filling is placed contraction commences, due to the disappearance of the solvent, leaving a space through which bacteria have free access. Hence, he concludes: "We are using materials which do not have the properties that our needs require. While contraction begins at once, it will continue slowly for months and possibly for years. This probably explains why so many root-filled teeth which at first seem normal, fail months or years after filling."

In view of these facts then, every "dead" tooth must rest under very grave suspicion. The chances are all against it, and if we have due regard for the health of the patient there can be no real cause for taking exception to the statement, that every devitalized tooth is a



potential source of danger and, in the presence of symptoms, should be surgically removed.

The comfort of the tooth, its local condition, or its serviceability alone are by no means dependable criteria as to the possibility of its harboring infection. Nor is the radiogram of unfailing value as a diagnostic aid. Neither is the condition of the gum to be given too much weight in arriving at a diagnosis. I have seen a mouth whence an abscessed tooth had been "pulled" fifteen years before and the gum gave absolutely no indication of trouble. In this case, however, the radiogram showed a sclerosed area in the jaw-bone surrounding a rarefied spot which at operation was found to be granulating tissue. In this instance, the indications for operation were the history of the "pulled" abscessed tooth, the radiographic findings and the further fact that, notwithstanding competent physicians could find absolutely no cause, the patient persisted in reporting symptoms at rather constant intervals, such as a general feeling of malaise, lack of energy, annoying pain at the back of the neck which sometimes jumped to the wrist. She was underweight, complexion sallow, and had been told by one physician that she was "merely neurasthenic," a very convenient, if scarcely illuminating, designation. Every symptom disappeared in due course after operation.

The outstanding fact related to infected "dead" teeth is that almost invariably the infection extends into the bone beyond the apex of the root. Practically in all cases at operation it will be found that the area involved is larger than indicated by the radiograph. Except in the cystic type these areas may assume almost any shape, very often extending at right angle to the root. They often have a series of pedicles extending at various angles. Particularly is this true in involvements of the superior laterals or bicuspid. In such cases obviously it would be impossible to remove the infected areas by merely pulling the tooth and trying to curet down the socket. It would be absolutely impossible to

reach an area of infection. Repeatedly at operation, when teeth were to be removed, just as a matter of demonstration of the futility of "pulling" teeth, after having laid back a flap and removed the alveolar bone over the root, I have with dental forceps "pulled" the tooth just to see if the granuloma would come out with the tooth. Failure to do so occurs in a sufficiently large number of cases, even when the root is well exposed, to warrant the positive statement that "pulling" teeth in the hope of removing periapical infection is absolutely contraindicated. It is unsurgical, brutal, and, at best, merely guesswork. Attempting to curet down a socket is merely scratching around in the dark. If a tooth socket extends nearly to or even into the antrum such blind attempts at curetment of a socket would be very apt to carry infection into the antrum. Not infrequently I have seen small spicules of broken-down bone lifted off the antral membrane when the gum and periosteum were retracted over teeth showing rarefied areas. "Pulling" such teeth and trying to remove infection by cureting such a socket, could have resulted only in forcing these spicules into the antrum.

Similar conditions are often present in proximity to the inferior dental canal, often encroaching closely upon the mental foramen. It is certainly a safer procedure in any surgical operation to have a clear field with good vision. No place else in the body would any one assuming the title of surgeon follow such brutal, haphazard and dangerous methods as does the average dentist who attempts to "pull" a tooth by main strength and brute force. More rapid and better healing follows the surgical removal than after "pulling." Naturally, this is to be expected. By the former method we make a clean triangular incision, retract the gum and periosteum over the buccal root or roots or the labial root, as the case may be. With a chisel we carefully remove the bone and lift out the root; being careful to sponge the field dry renders it possible to properly remove as much of the infected tissue as is humanly possible.

There is direct vision; no trusting to a sense of touch. All rough bone being carefully smoothed, the flap is sutured into place. Dead spaces are removed—a matter of prime importance. Impossibility of doing this is one of the most serious failures of “pulling” teeth.

Let us take for illustration an upper molar with three roots, divergent and curved, two of which show areas of rarefaction at the apices. Curetment, however accurate or inaccurate, as luck may be, is bound to enlarge the area at the ends of the roots. The sockets after extraction remain open, and these must remain as dead spaces, leading down to still larger dead spaces—the curetted areas, thus violating one of the best-established principles of bone surgery. Furthermore, in a very much greater number of cases than is generally known, if the teeth are “pulled” the alveolar plate is fractured, requiring a longer or shorter period to exfoliate, keeping the wound open, the tissues sore and adding to the burden of infection. Finally, when a tooth is “pulled” the soft tissues are bound to be more or less torn and ragged in a majority of cases, I care not how careful and expert the extractor may be.

When a number of teeth are to be removed prior to making a plate, if the surgical removal method is followed, the alveolar septa removed, and the bone trimmed down smooth so that a good flap can be sutured over, the patient will be vastly more comfortable, have a smoother and better ridge left and be ready for the plate sooner by far than by the “pulling” method.

Teeth that have long been infected with pyorrhea, where the pockets are deep and the alveolar process largely gone through infection, should by no means ever merely be “pulled” no matter how loose they may be. In such cases close study of good radiograms will give an idea of the amount of infection and the destruction wrought in the bone. Very seldom, if ever indeed, will there be shown the cystic-like or granulomatous growths adherent to the soft tissue of the pocket wall. Simple extraction only by

the greatest good luck would rid the field of this tissue. It is difficult to remove even when it can be seen and can be picked up. It would elude even the most vigorous and well-meant curetment of a socket, presupposing that the operator had even an inkling that it was there. Such pathological tissue, left in old sockets of the type described, is very slow in being thrown off by the natural reparative forces of the body, and there invariably results as well a much longer continued process of destruction in the bone than if all of it had been removed through proper surgical removal of the teeth, so much so that the gums and bony ridges of the patient are finally left in a very much worse condition for the retention of artificial dentures, no small factor to be considered, to say nothing of the harm of leaving in an open wound any pathological tissue that is possible of removal.

Naturally, many “dead” teeth are no doubt causing no demonstrable harm to the host thereof. A wonderful consideration must be had for the defensive and recuperative forces of nature. But such is the inherent suspicion resting against “dead” teeth, as I have just shown, that when symptoms persist that cannot positively be accounted for otherwise, it is not bad practice to advise the removal of the “dead” teeth, irrespective of their appearance, serviceability and comfort to the patient, and irrespective of how “good the bone looks” in the radiograph.

In a sufficiently large number of instances, the success achieved will warrant the procedure, particularly if we make no rash promises and speak frankly with the patient. For it must be especially borne in mind that systemic involvements having their genesis about dead teeth are of slow progress, their indications are varied and not always definite in their symptomatology. Many persons are going about never thoroughly sick, scarcely ever quite well, the victims of many hours’ active discomfort, to put it mildly, who unquestionably will be materially benefited by the surgical removal of their “dead” teeth.

In many such cases careful physical



examination often reveals nothing of consequence. Heart, lungs, kidneys, negative; urinalysis showing practically nothing save that it has been my experience to note a preponderance of cases with an acid reaction. The blood picture may be good on the whole, and here again the principal impression to be noted is the frequency with which there is a preponderance of the small lymphocytes in an otherwise good picture. Of course, notwithstanding the most careful search, there is always to be very clearly kept in mind the possibility of any of a variety of other involvements that have evaded observation. This should always be impressed upon the patient. We should be wary of rash promises and never jump at the conclusion that merely because the patient harbors one or more "dead" teeth he is bound to be made well by their removal.

Common sense, good judgment, and careful co-ordination of the gleanings of wide experience must ever be in the forefront of the armamentarium with which these problems are to be combated. Nevertheless, the fact remains that, by reason of a habit of thought, the very indefiniteness and variety of the symptoms exhibited, and the difficulty of establishing an exact relation between cause and effect, we are prone to underestimate the dangers of "dead" teeth, and finally to treat their removal as a

small matter rather than to attach thereto the same significance that the removal of dead, infected bone would demand elsewhere in the body.

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729 BUTLER BLDG.



## Digestion.

By JULIUS A. TOREN, M.D., Chicago, Ill.

(Read before the Odontological Society of Chicago, January 6, 1920.)

IT is with some hesitation that we present this paper on digestion for your consideration, since it is essentially medical rather than dental in character. However, a rather intimate association with a number of members of your profession for several years past has led us to believe, that the dental fraternity has awakened to a realization of the fact that theirs should be more truly a medical specialty than it has been in the past, and that they should have a greater fund of general medical information. It has been our privilege to address two dental societies during the past year, and the reception accorded medical matters on those occasions was most refreshing after the conservative attitude usually found in medical gatherings. It is this evident interest in general medicine which prompts this discussion.

In this paper we shall attempt to establish a definite line of reasoning as a basis for treatment of gastro-intestinal derangements and diseases. The treatment of disorders of the digestive organs has been for the most part empirical in the past. While we admit the value of empirical medicine so far as it goes, we must recognize the fact that the observations contributing thereto were often faulty, because of the fact that these observations were largely based upon the patient's symptoms rather than upon those things which may be demonstrated chemically and microscopically.

The treatment of diseases of the digestive tract has been extremely unsatisfactory in the past as many, many patients can testify after having been the rounds of one specialist after another.

There are, in our opinion, two reasons for these failures: first, there is a very evident lack of comprehension of the co-ordinate physiology of the digestive tract, and second, treatment, both medicinal and dietetic, has been based largely upon palliation of the symptoms and *indulgence* of digestive deficiencies rather than upon correction of the causative factors underlying those symptoms, and the development of normal digestion by adjustment of physiological demand.

The artificiality of modern life is nowhere more manifest than in relation to digestion. We eat almost all food cooked, whereas there is only one kind of food, *i.e.*, cereals, which absolutely requires cooking to prepare it for human consumption. Meat we cook to sterilize it, to develop its flavor, and to make it more friable; but raw meat is easier to digest than cooked meat. Then, too, we live indoors, which impairs the appetite; many of us do not get enough physical exercise to maintain active peristalsis and proper bowel function.

### PHYSIOLOGY OF DIGESTION.

We beg your indulgence while we review a part of the physiology of digestion for the purpose of refreshing our memories and establishing definite premises for our reasoning. These premises are well founded, being accepted physiological facts, abundantly proved by years of observation and experimentation on the part of recognized physiological authorities.

The human body is essentially a chemical laboratory, analytic and synthetic.

of which the gastro-intestinal tract is the chief analytical department. In this department the complex molecules of the three classes of foodstuffs (proteins, fats, and carbohydrates) are split into water-soluble, diffusible substances.

#### SALIVA.

Let us sketch briefly an outline picture of this remarkable process, considering first, the individual secretions, and second, the manner in which they work together and are interdependent. Beginning with the mouth we find the saliva with its enzyme, ptyalin, capable of digesting starches in an alkaline, neutral, or even faintly acid medium. Amylose, which constitutes the bulk of the starch granule, is digested with great rapidity providing the starch has been cooked sufficiently to rupture its cellulose envelope. The researches of Blake on the "Digestibility of Bread" have shown that "under physiological conditions most of the amylose must be changed to dextrins in the mouth, and that these dextrins as well as most of the amylopectin and its products of hydrolysis must be digested in the stomach; whereas the digestion of the amylocellulose must take place for the most part in the intestine."

#### GASTRIC JUICE.

Next we have the gastric juice with three enzymes, namely: pepsin, acting upon proteins; rennin, curdling milk; and gastric lipase, converting emulsified fats. All these enzymes act in an acid medium, which is supplied by the hydrochloric acid of the gastric juice. The digestive function of the gastric enzymes is of minor importance as compared with the mechanical service rendered by the organ through its action as a reservoir, and as a protection to the intestine against thermal and chemical irritation. The most important thing in the gastric secretion is the hydrochloric acid; a mineral acid manufactured by the gastric glands from the chlorine of sodium chlorid and the hydrogen of water, both found in the blood supplying the organ. Under normal conditions the acidity of

the gastric contents does not rise high enough to stop the action of the ptyalin of the saliva until fifteen to thirty minutes after the ingestion of the meal. It should be realized, however, that if an appreciable amount of acid is retained in the stomach from the previous meal the activity of the ptyalin is thereby inhibited, and the amyloextrins formed in the mouth then furnish material for bacterial and yeast decomposition.

#### SUCCUS ENTERICUS.

Next in order is the succus entericus (intestinal juice), alkaline by virtue of the presence of sodium carbonate, containing five enzymes, namely: erepsin, a proteolytic enzyme; three sugar-splitting enzymes, sucrase, maltase, and lactase, acting respectively upon sucrose, maltose, and lactose; and, last but not least, entero-kinase, an enzyme which activates the trypsinogen of the pancreatic juice.

#### PANCREATIC JUICE.

It should be carefully borne in mind that the secretion which accomplishes the bulk of digestion is the *pancreatic juice* with four enzymes, all of which act in an alkaline medium, the necessary alkali being furnished both by its own secretion and by the intestinal juice. The enzymes of the pancreatic juice are amylopsin, starch splitting; lipase, fat splitting; rennin, milk curdling; and trypsin, protein digesting. Trypsin is secreted in the pancreas and issues from the pancreatic duct in an absolutely inert form known as trypsinogen. Trypsinogen is activated by combination with the entero-kinase of the intestinal juice. Trypsin is the most powerful protein-cleaving agent in the digestive tract and the only one capable of carrying proteins to their ultimate end-products, the amino bodies. As you all know, the bulk of the protein food is absorbed in the form of amino bodies.

Last we have the bile, which is essentially more of an excretion than a digestant but which, nevertheless, plays an important rôle, through the physico-



chemical action of the bile salts, in emulsifying fats, so that the fat-splitting enzyme (lipase) of the pancreatic juice may act upon them, converting them to fatty acids and glycerol.

#### THINGS WHICH STIMULATE DIGESTIVE SECRETIONS.

What starts these various secretions and maintains them? The salivary secretion is started by appetite, and the sight, odor, and taste of food. Dry substances stimulate and liquids inhibit it. Thorough mastication favors a free flow of saliva, but the over-mastication practiced by the followers of Fletcher accomplishes, in our opinion, no particular good, and may be harmful in two ways: first, by producing exhaustion of the salivary glands to the extent that the saliva secreted during the latter part of the meal is poor in ptyalin; second, by reducing the food to a semi-fluid and almost tasteless condition in the mouth whereby appetite, which is so essential to both salivary and gastric secretion, is impaired or destroyed. Incidentally, Hawk has shown that meat swallowed in large fragments is digested better in the stomach than the same meat chewed fine. His experiments show that we have rather over-rated the importance of mastication in so far at least as proteins are concerned.

The gastric secretion is started by appetite and certain specific substances in foods, particularly the extractives of meat. Of great clinical importance is the fact that fats inhibit gastric secretion. The amount of hydrochloric acid secreted is dependent upon the amount of material in the meal with which it can combine, namely, alkaline salts and proteins only. In other words, the secretion of hydrochloric acid is truly selective. The habitual meat eater has normally a high acidity and the vegetarian normally a low acidity. The secretion of the intestinal juice is started and maintained by the impingement of acid chyme (the mixture of food and gastric juice) upon the duodenal wall. Free acid liberates the hormone, secre-

tin, in the duodenal mucosa which travels through the blood stream to the pancreas and starts and keeps up pancreatic secretion. To obtain adequate liberation of secretin there must be a sufficient amount of free acid in the chyme. The expulsion of bile from the gall-bladder occurs coincidentally with the secretion of pancreatic juice, the two entering the intestine together.

Let us now piece these separate facts together. The strongly acid chyme from the stomach impinges upon the duodenal wall exciting an active secretion of alkaline intestinal juice in an effort to neutralize the irritating acid. The acid of the chyme liberates the hormone, secretin, which starts and maintains pancreatic secretion. The trypsinogen of the pancreatic juice meets the entero-kinase of the intestinal juice and becomes active as trypsin. At the same time bile is expelled from the gall-bladder.

More than three-fourths of digestion occurs in the small intestine, and I wish to impress upon you with all the emphasis at my command the one fundamental fact that the all-important thing, the thing which starts and maintains the secretion of these juices which, as before stated, perform the bulk of digestion, is the *free acid* in the chyme. Therefore, the most important requirement for complete digestion is sufficient acidity of the gastric juice. Sufficient acidity also increases the motor power of the stomach insuring fine comminution of the food and complete emptying of the organ.

What then are the things which will promote ample secretion of acid? The three principal factors are: first, appetite; second, the presence in the meal of certain specific substances, namely, the extractives of meat; and third, the reduction of fatty foods to the minimum of body requirements since fats inhibit gastric secretion.

Let us consider briefly some clinical applications of the foregoing. In the great majority of cases of indigestion we find that some one class of food, either fat, or protein, or carbohydrate is not being taken care of properly, and that



the other two classes are comparatively well digested. Whenever foodstuffs are not properly digested, *i.e.*, changed to an absorbable form, and removed by absorption from the reach of the lower forms of life inhabiting the gastro-intestinal tract (bacteria, yeasts, molds, etc.), these organisms feed upon the undigested and unabsorbed portion and multiply with great rapidity. In the case of yeasts and molds the end-products are not particularly harmful, but in the case of bacteria they are often extremely harmful.

#### FAT INDIGESTION.

Fat indigestion is rare and occurs only in the presence of either organic disease of the pancreas or of interference with the flow of bile. The infrequency of fat indigestion may be due to the fact that fatty foods are seldom eaten to excess, being considerably less appetizing than other foods. Fatty foods, to be wholly digested must be emulsified, *i.e.*, mechanically broken up into minute droplets. This emulsification is accomplished by the movements of the intestine and by the admixture of bile with the food mass. Bile is absolutely essential to emulsification in the intestine. As an indication of the importance of bile we have only to remember that, although there is an active fat-digesting enzyme, known as gastric lipase, in the stomach secretion, it is able to digest only previously emulsified fats, such as milk. Pancreatic lipase, which accomplishes the bulk of fat digestion, is helpless in the absence of bile.

The diagnosis of fat indigestion is based on the finding of free fat in the stool. The relief of fat indigestion itself, without regard to the many possible causes, is the administration of bile salts with each meal, preferably in the form of inspissated ox-gall, ten to thirty grains in capsules immediately after each meal.

#### CARBOHYDRATE INDIGESTION.

Carbohydrate indigestion is more common than fat indigestion, and less com-

mon than protein indigestion. Those who have carbohydrate indigestion suffer greater distress, many times, than those with protein indigestion. Carbohydrate indigestion, like a barking dog, is more noisy than dangerous, while protein indigestion is a stealthy foe to the body. We say that carbohydrate indigestion is "noisy," advisedly. Common symptoms are belching, passing of flatus, and rumbling noises in the abdomen.

Carbohydrate indigestion may occur either in the stomach or in the lower bowel. When it is in the stomach, there is belching of either tasteless or sour gas (so-called sour stomach). Lack of digestion of starches may be due to several causes: first, killing of the ptyalin of the saliva by acid chyme retained in the stomach from the previous meal, as in deficient motility of the stomach, dilatation of the stomach, gastroparesis, pyloric spasm, pyloric stenosis, etc.; second, eating highly acid fruits in material quantity before or with a starch meal as, for example, grape-fruit before the breakfast cereal; third, starch granules enveloped by a film of fat, as in foods fried in fat, hot buttered toast, etc.; fourth, starch granules enveloped in a film of dried protein, as in stale bread; fifth, insufficiently cooked starch, as in crackers, bananas, some breakfast foods, etc. Lack of starch digestion in the bowel is usually due to the starch granules being enveloped with a film of cellulose, as in certain beans, cornmeal, etc., which is not digested by any enzyme but is broken down by bacteria in the lower bowel. The gas production in carbohydrate indigestion is caused principally by yeasts and molds. The diagnosis of carbohydrate indigestion in the stomach is based upon the finding of free starch, yeast cells and mold spores in the analysis of the stomach contents after a suitable test meal, and when in the bowel by examination of the stool. Carbohydrate indigestion, of itself, without regard to the underlying causes, can be relieved by the administration of barley diastase, to be taken in fairly large doses during the course of the meal.

## PROTEIN INDIGESTION.

We now come to the commonest and really dangerous form of indigestion, namely, protein indigestion. It is a peculiar fact that in many cases the sufferer from protein indigestion does not realize that he is ill from a gastro-intestinal condition. He may have no symptoms referable to the gastro-intestinal tract. He is always a victim of toxemia, both from the waste products of the bacteria themselves, and from the protein-cleavage substances produced by them. In a case of protein indigestion, evidenced by deficient acidity of the gastric juice as determined by analysis, the presence of a bad odor in the stool (skatol), the presence of incompletely digested protein in the stool, the occurrence of a marked indicanuria, and in many cases increased blood pressure, the treatment consists entirely in increasing the acidity of the gastric secretion. When we have a weak arm we do not put it in a sling with the expectation of making it stronger thereby. Yet this is what nine persons out of ten do when they have protein indigestion, *i.e.*, stop eating meat.

It is an indisputable fact that glandular organs function in accordance with the demands made upon them. Many a woman who cannot nurse one baby satisfactorily can furnish food for two infants easily. When one kidney is removed the other increases in size and finally develops a greater functional capacity than the two kidneys had originally. And so in the case of poorly functioning digestive glands, if we pamper them and indulge the deficiency by eating only the things which are easily cared for, the functional deficiency becomes worse rather than better. It is axiomatic that what any functionally weak organ needs is intelligently applied systematic exercise if it is to become stronger. This fact is just as true of the digestive glands as it is of a weak arm. Our method of treating protein indigestion is to restore glandular activity by making a physiological demand upon the gastric glands for greater activity.

This is accomplished principally by stimulating the appetite (out-door exercise, tastefully served and appetizing foods) and the eating of meat. Meanwhile, in order that the meat eaten may be certainly cared for until the secretion can recover its normal acidity, dilute hydrochloric acid is administered in mathematically calculated doses sufficient to bring the acid content, for the meal of given bulk, to the normal 0.25 per cent. by weight. The meat is gradually increased and the acid gradually withdrawn over a period of from two to four weeks or longer. The patient is instructed to eat plenty of salt—all that the taste will tolerate. Fats, which tend to inhibit gastric secretion, are eliminated entirely from the diet. The hydrochloric acid is administered thirty minutes after the meal is finished so that it may not interfere with the digestion of starches by the ptyalin of the saliva.

In connection herewith it should be stated that other acids than hydrochloric may be used, *i.e.*, fruit acids, such as citric, and organic acids such as lactic (buttermilk). It is our belief that the relief from intestinal toxemia as produced by Metchnikoff's buttermilk diet is due, not to the change of the intestinal flora as has been maintained, but rather to the improvement in protein digestion resulting from the augmenting of the acid content of the stomach by the lactic acid ingested. A little clinical observation along this line, which tends to substantiate this belief, is the fact that persons suffering from carcinoma of the stomach usually have very good digestion, notwithstanding the fact that there is little or no secretion of hydrochloric acid. This maintenance of good protein digestion is due, we believe, to the production of large amounts of lactic acid in such a stomach by lactic acid-producing bacteria which are always present in large numbers in a carcinomatous stomach.

It is never necessary to give artificial preparations of enzymes for the relief of protein indigestion. Enzymes are always present in ample amount in the glands. It is only necessary that the



glands be made to secrete. The only exception to this rule is that extremely rare condition known as atrophic gastritis (usually due to chronic alcoholism) in which all the gastric glands are destroyed.

#### HYPERACIDITY.

The treatment of hyperacidity (hyperchlorhydria) as taught by our so-called "authorities" is entirely at variance with physiological common sense. Hyperacidity, as you know, is a constant concomitant of gastric ulcer, and is the thing which causes the distress in that disease and also prevents healing of the ulcer. Textbooks almost universally advise the administration of alkali and protein foods (milk, eggs, and meat), because these substances, by combining with the free acid, relieve the pain resulting from the irritation of the nerve endings in the stomach wall by the acid. It must be borne in mind that the stomach is a glandular organ with a selective secretion. In this instance we have an over-stimulated gland, which alkali and proteins only stimulate to greater activity. Our method is to withdraw from the dietary those substances which call for acid, namely, proteins and alkali, and administer fats (butter and olive oil) which inhibit the secretion. The bulk of the diet consists of carbohydrates. Further, and allow me to lay special emphasis upon this point, to make hydrochloric acid we must have chlorin. The chlorin of the hydrochloric acid is derived from the excess sodium chlorid in the body tissues over and above that required by the blood itself. The blood retains its 0.8 per cent. of sodium chlorid with great tenacity even in starvation. The kidneys excrete normally fifteen grams or half an ounce of sodium chlorid every twenty-four hours. If then we exclude sodium

chlorid from the dietary it is not many days (usually five to seven) before the surplus of sodium chlorid in the body is so diminished that the secretion of hydrochloric acid is automatically reduced. Patients with hyperchlorhydria are almost invariably heavy eaters of salt, and yet little or no attention is paid to this fundamental factor by the average clinician. So far as the pain, either of simple hyperchlorhydria or of hyperchlorhydria with ulcer, is concerned, it can be overcome just as well by the drinking of cold water, to dilute the acid, as it can be by the use of alkali. It is essential, however, that the water be very cold so that it may act as a diluent of the acid for as long a time as possible. Warm water is rapidly absorbed.

In closing permit me to direct your attention to the important rôle of sodium chlorid in the chemistry of digestion. The chlorin of the sodium chlorid brought to the gastric glands by the blood combines with the hydrogen of water to form the hydrochloric acid of the gastric juice, and the sodium of the sodium chlorid combines with carbon dioxid to form sodium carbonate, the alkali of the intestinal juice. When the hydrochloric acid and the sodium carbonate meet in the intestine, they unite to form sodium chlorid again, which is absorbed and used over and over. The carbon dioxid which is liberated in this last reaction constitutes the only gas formed in the normal gastro-intestinal tract in material amount. Being freely soluble in an alkaline medium, it is taken up by the alkaline intestinal contents and held in solution. The absolutely normal digestive tract is consequently practically gasless.

25 E. WASHINGTON ST., CHICAGO, ILL.

[See also *Discussion*, as reported under "Proceedings of Societies," this issue.]



## Combating Hemorrhage from a Dental Standpoint.

By L. R. GANS, D.D.S., New Haven, Conn.

AN intimate knowledge of the structures with which we daily come in contact should be a significant part of our personal equipment to enable us to meet and overcome those obstacles that may confront us at unexpected periods. The same rules laid down and applied by the medical profession in combating hemorrhage hold true in our own. An incident of but small significance at a glance, but which might have proved of quite serious consequences, is here cited in the hope that the experience may prove of some benefit to those who have occasion to do surgical work.

A patient, male, age forty-five, was referred to me for the removal of some fifteen or eighteen teeth, all in a pyorrhetic condition and pus exuding freely from the gum margins. The patient had been in poor health for years, and having gone the customary rounds of physicians, was finally advised by a gastroenterologist to have the offending teeth removed in order to arrest the pus absorption. Being quite busy this particular morning, the teeth and gums were merely examined, the patient being sent to the hospital, where the teeth were to be extracted under ether anesthesia, with the customary instructions. Arriving at the hospital about 2.30 P.M., previously having called a physician to administer the ether, the teeth were extracted and on leaving, the proper orders were given for the post-operative care of the patient. Twelve hours later, I received an emergency call from the hospital and on arriving there was told that all the usual styptics and hemostatics, local and general, had been used without avail in an attempt to control

the hemorrhage following the extraction. The patient was in quite a critical condition from the continuous loss of blood. A physician friend of mine whom I had taken along with me, while examining the mouth, detected the characteristic acetone odor of diabetes and immediately suspected the patient to be a diabetic. Inquiries were then made as to the previous examination of the patient, and it was found that the patient had received the most superficial examination and that no urine analysis had been made. Ether, which is contraindicated in diabetes, was the anesthetic used. After hours of digital pressure in conjunction with gauze packs and bandages the hemorrhage was finally controlled. This experience necessitated the keeping of the patient in the hospital for two weeks.

After all was said and done, I was confronted with the fact that I alone was responsible for the safety of the patient and that it was my duty to know whether that patient was a diabetic or not. The surgeon in charge assumes complete responsibility of the operation. Although the anesthetist was a medical man, it was not essential for him to make a urinary analysis, as he was but an assistant to me during the operation. This fact has been confirmed in dental jurisprudence.

How are we to successfully control our cases of hemorrhage? Obviously the best plan would be to prevent such cases from occurring where possible by becoming thoroughly acquainted with the causes of hemorrhage, and in the event of hemorrhage unavoidably occurring we should know how best to combat it.

Let us consider (1) the proper examination of the patient prior to extraction and surgical work; (2) the blood itself; (3) the bloodvessels; (4) the surrounding structures; (5) control of hemorrhage: (a) local styptics; (b) general treatment.

### 1. EXAMINATION OF THE PATIENT.

During an examination mental note should be made of all the essential and associated structures of the oral cavity. A history should be obtained not only of the diseased condition from which relief is sought but also the hereditary and personal history of any and all related conditions. It should be borne in mind that the mouth is an integral part of the body and may present local expression of general diseases.

Let us consider in undertaking extensive extractions or any form of surgical work, be it either under local or general anesthesia, that we alone have complete charge of the case and, therefore, are responsible for the welfare and safety of that particular patient. We are expected to perform all the duties required and incumbent upon such work. After inquiry, if the patient states that he has experienced difficulty in controlling hemorrhage from a cut finger or other superficial wounds, let us be on our guard and suspect hemophilia. It is a good policy to take into consideration the age and general appearance of the patient and inquire as to any trouble in previous extractions. This must be done in a diplomatic way without causing any excitement on the part of the patient. Where suspicion or doubt arises, co-operation with one of the medical profession must be obtained.

### 2. THE BLOOD.

Let us recall that the blood itself being a nutritive fluid, all physiological processes in the living organism are highly dependent upon its presence and proper circulation. The loss of blood is followed by a loss of the physiologic properties of all the tissues within a

short period of time. Blood possesses that characteristic property of coagulating shortly after it escapes from the bloodvessel. As it makes its appearance on the surface of the injured tissue it is at first liquid, but in a few moments it becomes gummy and gelatinous and soon begins to form a clot. This clot continues to grow into a firm mass exuding a light yellow, liquid blood serum, the essential constituent of the blood which forms the clot being the fibrin. The physiological value of the clot is that it controls hemorrhage by closing the lumen of the wounded bloodvessel.

The necessary time required for the formation of the blood clot varies in different individuals or in the blood of the same individual under varying conditions. In the normal patient it will take from three to ten minutes for the liquid blood to pass into the jelly stage. The separation of the clot and serum takes place gradually and is usually completed in from ten to forty-eight hours. The time of coagulation, however, can be lengthened or shortened by either changing the external conditions or by altering temporarily the normal composition of the blood itself. Pathological conditions, such as hemophilia, scurvy, diabetes, specific diseases and many others are decided factors in coagulation. These should be well considered before surgical work is undertaken.

### 3. THE BLOODVESSELS.

The blood vascular system is tubular throughout, the vessels possessing distinct walls varying in size, in structure and thickness, but all containing blood which is conveyed by means of them to and from the tissue elements of the body. The blood is propelled along the vessels chiefly by a central propulsive organ, the heart, a fact to be considered in administering heart stimulants when controlling hemorrhage. That part of the vascular system with which we most often have to deal is the capillary system which permeates the field with which we most invariably come in contact during extraction, etc. The walls



of the capillaries are simple in structure, the smallest capillaries consisting of but a single layer of endothelial cells anastomosing with one another at their terminals and are thus able to give quite a sufficient supply of blood. Due to the absence of a muscular layer in the capillary wall, we lose that important feature of elasticity which aids in closing the lumen. In dealing with hemorrhage we must consider the linking and anastomosing branches of the various arteries, veins and capillaries supplying a certain part.

#### 4. THE SURROUNDING STRUCTURES.

In considering the surrounding structures we can recall the tissues enveloping the tooth with special regard to the bone. In the maxillæ and mandible the osseous tissue is composed of two compact layers with a layer of soft cancellous bone, the dense bone merely differing from the cancellous bone in the compactness of its tissue. The periosteal membrane, which surrounds the bone and which plays so important a part in its development, sends its processes through the various Haversian canals which carry with them vessels and cells, thus forming an organic meshwork. In the cancellous tissue of the bones of the maxillæ we may recall the marrow fluid within its substance characterized by the presence of marrow cells, the erythroblasts. The alveolar process normally envelops the roots of the teeth to within a short distance of the gingival line, conforming to the arrangement of the teeth in the arch.

The anterior palatine foramen lying in the median line directly back of the central incisors is often separated from the roots of the central incisors only by a thin layer of bone which is easily fractured. The posterior palatine artery runs in a deep groove in the surface of the bone very close to the apices of the roots of the second and third molars. This artery can be easily wounded or cut in efforts to extract the roots of these teeth.

The periodontal membrane, as we recall,

invests the roots of the teeth from the gingival line to the apices of the roots, like a sac, and is composed of connective tissue supporting an abundant supply of bloodvessels, nerves and lymphatics. The cancellous portion of bone forming the alveolar process is richly supplied with bloodvessels and these enter the alveolar tissue and periodontal membrane from all sides. The porous and spongy bone contains capillaries, which may ooze blood for a long period after an injury. The gums richly supplied with bloodvessels are composed of connective tissue, and being continuous with the periosteum of the bone and the periodontal membrane, by virtue of the anastomosis of the bloodvessels, have an abundant blood supply and so an injury may cause considerable bleeding. Under a general anesthetic a clear view of the field of operation must be had to avoid unnecessary injury to bloodvessels, tissues, etc., these precautions often saving many hours of unsuccessful effort in controlling hemorrhage from an apparently simple extraction.

#### 5. CONTROL OF HEMORRHAGE.

In all forms of surgical operations, the unnecessary loss of blood is to be rigidly avoided and the control of hemorrhage should always be considered before actual work is begun. The proper planning for the incision and the arrest of the bleeding constitutes an important factor. The position of the patient especially influences venous bleeding which is greatest when the head is low.

If for any reason it is suspected that the clotting power of the blood is below normal, the clotting time should be ascertained and if sluggish an attempt should be made to remedy the defect. Calcium lactate has been proved to materially aid by lessening the clotting time of blood. The administration of one to four grams daily, for several days prior to an operation, has been productive of good results. When producing conduction anesthesia, if the minor details are not carried out, such as the use of freshly distilled water, sterile



solution, etc., hemorrhage may follow after the anesthetic effect of the solution has subsided. A toxic amount of cocaine in gum tissue is deleterious to normal healing and thereby conducive to hemorrhage. Hemorrhage is designated as arterial, venous, or capillary. To intelligently treat bleeding, one must understand and work in harmony with the natural hemostatics. These are the retraction and contraction of the cut vessel, the lowering of blood pressure by reducing the heart action and, above all, the clotting of blood.

Arterial bleeding is usually controlled by digital pressure, forceps pressure, or by ligation of the vessel and tissues *en masse*. Bleeding from the vessels situated in bony canals, such as the inferior dental or posterior palatine, may be controlled by inserting a peg into the canal or by occluding it with a soft piece of wax. Horsley uses for this purpose the combination of phenol one part, olive oil two parts, and white wax seven parts. The wax is sterilized by heat, and when cooled pieces of the kneaded wax may be forced into the bone spaces and canals. The ligature when used should be drawn just tight enough to close the lumen of the vessel.

In wounds of any depth, especially if the vessels cut are not too large, the bleeding may be controlled by a temporary packing with gauze. If the wound is not sufficiently deep to maintain the packing, it may be fixed in place with sutures, the pressure of gauze packs, or by holding the lower and upper jaws together by means of bandages. Another of the effectual ways of controlling bleeding in most wounds of the mouth is by deep approximation sutures drawn sufficiently tight to bring the cut surfaces together. Light pressure on veins will control the flow. Continued capillary oozing is almost always due to slow clot formation and may be treated by lowering the blood pressure and increas-

ing the clotting time, also by the local application of styptics. Direct application of a one to one thousand solution of adrenalin chlorid until the clot has time to form or other local applications, such as tannic acid, alum, or ferric chlorid, will cause a contraction.

For persistent bleeding following the extraction of one or more teeth, the socket should be packed with antiseptic gauze or cotton. If this does not control the bleeding, two or four thicknesses of the gauze are laid smoothly over the surface of the packing and the adjacent gums and the whole is covered with soft modeling wax or quick setting plaster of Paris. Before the wax or plaster sets the jaws are closed firmly and held in position. The application of foreign serum or various coagulants, alcohol, boiling water or actual cautery, may be used with admirable results, but any application that produces a slough or favors sepsis may be only temporarily effective, for as the slough separates bleeding will begin again due to the absence of an intravascular clot.

As hemorrhage persists, the blood pressure falls. The general and local blood pressure is lowered by laying the patient in a recumbent position, administering sedatives and not resorting to stimulants. To raise or stimulate a patient who has fainted from the loss of blood is but to invite an increase of the bleeding. Often bleeding can be controlled by removing the clot and replacing the superficial packing by sterile gauze until an intravascular clot has formed. A slow pathological process causes a continual oozing and may end in a fatal anemia.

Thus it can be seen that not only must hemorrhage be combated from an intelligent aspect during its active stage, but also the prophylactic treatment may in many instances prevent untoward results.

## CORRESPONDENCE

### "The Dental Hygienist."

TO THE EDITOR OF THE DENTAL COSMOS:

*Sir*,—In an article in the December issue of the DENTAL COSMOS on the hygienist by Dr. Barrett, the author takes the premise that all of our profession, who favor the oral hygienist movement, are prompted by absolutely selfish motives, and that we are all working with no other object in view than to put an oral hygienist in our various offices at \$25.00 per week and, as he expresses it, make said hygienist work thirty-nine hours a week at \$3.00 an hour making \$117.00, and from that subtract \$25.00 and you have the income from one nurse. (December DENTAL COSMOS, p. 1207.)

When I look back over the years I have spent in the practice of dentistry many of my old professional friends, who are dead and gone, come to my mind, and I recall how they worked for the advancement of their profession, thinking little of their own welfare, preaching dental truths whenever the opportunity occurred, trying in every possible way to improve the oral cavity and, in so doing, the health of the community in which they lived. These men were justly honored, respected and esteemed in the several countries in which their lives were spent. No one ever accused them of profiteering (we will leave that to one of our own number), although some of them advanced ideas that at the time seemed radical. I have inventoried the estates of several of my old friends and (Oh, the pity of it!) after years of honest, hard, conscientious labor, they leave a pittance to their families. The same conscientious, brainy effort in any other line of human endeavor would have brought a competency.

With reference to Dr. Barrett's statement on page 1205 of the December DENTAL COSMOS regarding the men practicing in the wealthy, refined section known as the Back Bay in Boston, it would be safe to wager that the last ten men who have died after fifteen or twenty years' practice in the refined, cultured section referred to did not leave an average estate of \$10,000, unless they had interests aside from their practice. Dr. Belcher, the father of the humanitarian idea of oral hygiene, has just passed away after a life of self-denial and self-sacrifice. I trust the memory of so fine a character will always be a benediction to our profession. No one of us will ever accuse him of profiteering or misrepresent his motives.

While we are splitting hairs in the State of Pennsylvania over "A New Species of Dentist," thousands of children who need just the attention the hygienist could give them are denied it, and many of them will become human derelicts at the age of thirty-five or forty from the lack of it.

Fortunately for the State of Pennsylvania there is at the head of the Commonwealth Department of Health Dr. Edward T. Martin. Dr. Martin realizes that we can never have community health until something is done to improve the conditions of the oral cavity for the children, and he has authorized me to obtain for him ten hygienists to look after the children's mouths in the various institutions throughout the state, and if the work of the ten proves satisfactory, more are to be employed. Two hygienists are at work now and more will follow as soon as it is possible to get them.

On January 9th, I wrote Dr. G. K. Strode, Chief of the Division of School Health, asking his opinion of the work done by the hygienists, and the following is a copy of his reply:

HARRISBURG, PA., January 20, 1920.

Dr. H. M. BECK.

Wilkes-Barre, Pa.

*Dear Doctor*,—Since receiving your communication of January 9th I have had occasion to visit Mount Alto in company with Dr. Sands of Philadelphia for the purpose of reviewing the work of our dentist and of the dental hygienist on duty there.

Both Dr. Sands and I felt that Miss Crawford's work as a dental hygienist was entirely satisfactory. Considering the equipment which she has to work with, she has been able to accomplish a great deal with the mouths of the children in that sanitarium. . . .

I shall be glad to advise you later on any further observations which I make and also to tell you something of the progress of dental work in the Department.

Very truly yours,

GEO. K. STRODE, M.D.,  
Chief, Division of School Health,  
Commonwealth of Pennsylvania.

On page 1207 of the December DENTAL COSMOS, Dr. Barrett makes the following statement:

Every hygienist graduated from the Forsyth Infirmary and ninety-eight per cent. of all from Eastman, if I am correctly informed, have found their way into private practice, not one to the field of charity. It is time to push gently aside this cloak of charity that has been the foundation stone of all the legislation thus far granted to this new species of half-trained oral operators, and to tell the facts just as they are. It is much easier and the prospects much brighter for success to approach law-making bodies with a proposition that has charity as its object and foreword than to seek the same ends through frank admission of private gain.

I felt very sure that Dr. Barrett was not telling "the facts just as they are." As a matter of fact I was sure he was misleading the members of the Pennsylvania State Dental Society, so I wrote to Dr. H. J. Burkhart, the Director of the Rochester (or Eastman) Dental Dispensary, asking if Dr. Barrett's state-

ment was correct and the following is his answer:

ROCHESTER, N. Y., January 29, 1920.

Dr. H. M. BECK, Wilkes-Barre, Pa.

*Dear Dr. Beck*,—Your letter of January 28th has been received. I noticed the statistics which Dr. Barrett gave in a paper before the Pennsylvania State Dental Society at Pittsburgh last year. It has seemed to me that, if he wished to be accurate and fair, he might have obtained reliable information by writing to the schools that have graduated dental hygienists. Our records show that over 45 per cent. of the graduates of this school are or have been employed in schools, hospitals and public institutions. Sometimes the percentage has been greater, at times it has been about 55 per cent. I have preferred to send graduates to public rather than to private practitioners, because I have felt that their work would demonstrate to the public the value of oral prophylaxis and in that way stimulate public authorities to make larger appropriations for dental work. If I can be of further service to you at any time, please let me know.

Sincerely yours,

(Signed) H. J. BURKHART, *Director*.

In the mining districts of Luzerne County hundreds of foreigners are employed. I would like some of the opponents of the oral hygienist to examine the mouths of one hundred of the children of these foreigners before the oral hygienist had treated them, and then examine them again after her work was finished. It would be a revelation to them. The children are so anxious to learn and take advantage of any opportunity given them, and I know that a clean mouth and a talk on hygiene has started many of them on the right road to good American citizenship.

In spite of what Dr. Friesell and his Pittsburgh friends have put over in the State Society, oral hygiene has come into the State of Pennsylvania to stay whether Dr. Friesell realizes it or not, and if he and his friends were half as industrious in their endeavor to train hygienists and properly legalize them, as they have been in opposing the movement, the State of Pennsylvania would soon have a great body of trained work-



ers for the public and private health (if you will), and the appeal we have made in vain in the past for recognition of the great work we are doing for humanity would meet with proper response. The public schools of Wilkes-Barre are asking for oral hygienists, the state institutions are asking for them at the request of their medical advisers. How is Dr. Friesell going to meet this problem? If he has something to offer, why does he not tell us his solution of the problem; if he has nothing to suggest, why this dog-in-the-manger attitude? If Dr. Friesell will start a school for the training of oral hygienists, I would do everything in my power to help make it a suc-

cess, and I have no doubt but that the State authorities would give an appropriation to help finance such a movement.

The medical men are holding out their hands to us for help; the opportunity is here to move onward and upward. We have accomplished great things in the past; greater activities and achievements are ahead. Why cannot we all realize it and take advantage of it? Not for profit, as some would lead us to believe, but for the advancement of our profession and the welfare of humanity.

HARRY M. BECK, D.D.S.

WILKES-BARRE, PA.

## Calcified Dental Pulp.

TO THE EDITOR OF THE DENTAL COSMOS:

Sir,—I am enclosing a radiograph of the upper centrals, which may be of in-



terest to you and the profession. The patient, Miss H., presented about three weeks ago and asked that the right cen-

tral be examined, as for the past year she had at times had a vague "consciousness" of it, although it did not ache or cause any pain.

The tooth had an opaque appearance but did not look like a "dead" one. I decided that it was a case of "pulp stone" and accordingly opened from the lingual surface, only to find that there was no sign of a pulp chamber, and after going farther with drills (there being no pain), decided to try acid treatment but without results.

At the next sitting after drilling about one-third of the length of the root, I informed her that I could find no canal or any sign of pulp and decided to make an X-ray, which, as you see, shows no signs of a canal or pulp chamber.

Respectfully,

JNO. T. ASHTON, D.D.S.

ALEXANDRIA, VA.

# PROCEEDINGS OF SOCIETIES

## The Eastern Association of Graduates of the Angle School of Orthodontia.

Tenth Annual Meeting, held in New York City, May 5 and 6, 1919.

(Continued from page 259.)

### MONDAY—*Afternoon Session.*

The meeting was called to order at 2.15 o'clock, by the president, Dr. Hatfield.

The PRESIDENT. We start today in virgin territory. We have a man with us who is studying the origin and tendencies of the very factors with which we deal—factors controlling the formation of the dental arch.

PROFESSOR WILLIAM K. GREGORY of Columbia University will address us on the "Facts and Theories of Evolution with Special Reference to the Origin of Man."

[This paper is published in full at page 343 of the present issue of the DENTAL COSMOS.]

### DISCUSSION.

Dr. Milo Hellman, New York City. I am particularly pleased with Dr. Gregory's lecture today. Whether it is due to my having heard this lecture some time ago or whether he has made some favorable changes, the fact remains that I enjoyed it thoroughly. The reason I asked Dr. Gregory to deliver this lecture to us was this: Some time ago an exceedingly prominent man in orthodontia expressed certain ideas in the course of some correspondence which

were quite illustrative of the notions in general relative to evolution. Apropos to a certain topic, I happened to mention some evidence as borne out by palæontology, relative to the teeth of man. That evidence was rather in refutation of some existing standards which we follow. In defending the old ideas prevailing in dentistry and orthodontia, he said: "Oh, these men are sitting in the museum and working on theories. Why, they cannot compare with us—with you and me,—who are working on the actual thing. You must not be misled by these men."

I have become interested in the last few years in Dr. Gregory's special subject, and I find that we who deal with teeth have yet a great lesson to learn. Moreover, that great lesson must come through studies on evolution and based upon the evidence as found in paleontology and comparative anatomy. I believe teeth of extinct fossil remains must be studied by men like us who are directly interested in them. The surface has hardly been scratched.

I would call your attention to the fact that in bringing out scientific evidence for any phase of our subject, we must resort to three main sources: embryology, comparative anatomy and paleontology. Each of these is not faultless and therefore it is necessary to obtain the evidence from the three sources.

An old idea very prevalent in dental circles is that whenever we see a fourth molar or a supernumerary tooth, we say that it is a reversion. Reversion to what? Dr. Gregory showed us that the placental mammalian dentition has never had more than three molars; so what do we revert to? To fish? We do not as yet know the direct phyletic relationship between fish and mammal. But we do know the placental mammalian dentition never had more than three molars, which we still retain. The only thing which has changed in man from the original primitive placental dental formula is the loss of one incisor and two premolars.

I thank Dr. Gregory and wish to express my high admiration of his lecture, because he has brought out a most complete series of palæontologic evidence bearing on evolution.

**Dr. Gregory** (closing). I can only voice my personal pleasure at being with you, and meeting so many of my old friends, and also say that I should be very glad to have any of you come to the museum and see some of these specimens, if you are interested in them.

Adjourned to Tuesday morning.

#### TUESDAY—*Morning Session.*

The meeting was called to order by the president, at 10.30 o'clock.

PROFESSOR FRANZ BOAS of Columbia University, New York City, gave a lecture entitled "Some Notes on the Eruption of Teeth," as follows:

#### **Some Notes on the Eruption of Teeth.**

By Professor FRANZ BOAS, Ph.D., Sc.D., LL.D.,  
Columbia University, New York City.

The problem which I wish to present to you is related to the general question of the rate of physiological development of the individual. When we observe the physiological development of a series of individuals from birth on, we find that certain physiological stages are reached by different individuals at

different times. Beginning with the time of birth, we see first of all that the period of gestation is fairly uniform. Nevertheless, certain variations may be observed, and the period varies within the range of a number of days. As time goes on, certain other physiological changes may be observed. One of these is indicated by the eruption of the teeth. When we examine the time when the first tooth appears, we find differences between different individuals, the time of eruption of the first tooth varying within the range of several months.

Every time a new stage of development is reached, we find that it occurs at a definite chronological age for many individuals, but that the time of reaching the stage in question varies considerably among different individuals.

The period of sexual maturity is another stage at which this phenomenon may be noted. The time when this period is reached is not the same for all individuals, but there is a considerable degree of variability.

It is important to measure not only the time when such a stage is reached by most individuals, but to determine also the amount of variability, the degree to which individuals differ among themselves. Let me explain briefly how this may be done. I will choose as my example the time of eruption of the first incisor. We may measure the degree of variability of the time when this particular physiological condition obtains, by counting off one-quarter of the series from the extreme lower end of the cases in which we have a premature eruption, and one-quarter of the series from the extreme upper end in which we have late eruption, leaving one-half of the whole series and determine the age limits within which the middle half of our series is contained.

When speaking of the measure of variability of physiological development, I mean age limits obtained in the manner just described.

For the period of gestation, the whole variability is but a few days. When we reach the time of the first dentition, we have a variability of a few weeks. At



about six years the variability has increased to several months. At the time of sex maturity, it is more than one year. At the time of eruption of the third molar teeth, the variability has increased to about two years, and at the time of the first signs of senility to about six years. We may summarize, and say that the variability of the time at which certain stages of physiological development are reached increases enormously as life goes on.

The data relating to this subject that are at our disposal are exceedingly meager and unsatisfactory. Naturally, those for gestation are fairly good. Those relating to the stages of childhood which are indicated by the eruption of teeth are few and very difficult to obtain. There are certain observations made in Austria, by Fleischmann; others by Dr. Channing of Boston; a series of observations on boys in Porto Rico; and quite recently Dr. Milo Hellman has placed at my disposal his observations on this subject. For the exact determination of a question of this kind, we need, however, much larger and more accurate series than those we have. We must know the exact age of the child, not only by years but by months, the place and season of observation, and other details. On account of the necessity of obtaining very full material, we cannot hope for success, unless we have the co-operation of all those interested in this matter.

There are a few points, however, which seem to appear from a study of the meager material at our disposal. The first of these relates to the differences between the sexes. Observations on stature, weight, and phenomena of adolescence, prove that there is a definite difference in the period of development of males and females, and this difference is such that at about fourteen years the girls are more than two years ahead of the boys.

The development of the bulk of the body of both males and females shows a very rapid increase in the first three months of fetal life. After the first division of the ovum, the increase in bulk is very rapid until a time of pre-natal

life that cannot be determined with accuracy. From that time on the rate of growth decreases rapidly and continues to decrease in girls until approximately the ninth year, and in boys until about the eleventh year. Then follows a period of acceleration in the rate of growth which continues until very nearly the time of sexual maturity. After that, it decreases rapidly until the full development of the body has been attained. The minimum rate of growth in childhood occurs in girls about two years before it occurs in boys. The maximum rate of growth during adolescence is also about two years earlier in girls than in boys.

The growth of the head of the two sexes shows peculiar differences. The head of the girl is always smaller than that of the boy. While stature and weight are about the same for the two sexes during childhood, the head shows the characteristic sexual differences in size even in early ages. This must be explained as follows: At birth the head is comparatively large and the rate of growth is slow. Since girls are about one or two years ahead of boys in physiological development, we must compare, for instance, boys ten years of age with girls eight years of age. The increase in the size of the head during this interval is much smaller than the characteristic difference in size between the heads of the sexes. Hence the head of a girl will always appear smaller than the head of a boy of the same age. On the other hand, the growth of bulk of the body is so rapid that the stature of the girl of a certain age is very nearly the same as that of the boy of the same age, while, if we compare a boy and girl of the same physiological development, the bulk of the body of the boy is greater than that of the girl.

The differences in physiological development of which we are speaking, must not necessarily be the same for all parts of the body. The bulk of the body is determined by the growth of the combined skeleton, muscular system, and of all the other parts of the body.

Sexual features are determined by a

set of physiological conditions that do not necessarily exert an influence over the development of the bulk of the body. The development of the jaws and teeth may also be subject to particular causes that do not greatly influence other parts of the system. It is therefore not necessary that the differences in the rate of development for the two sexes should be the same for all these different phenomena.

The available series relating to the eruption of the teeth show that the difference in the rate of development in the two sexes is exceedingly slight. The canine teeth of the male seem to develop earlier than those of the female, an anomaly which requires special investigation. The differences in period referred to before do not seem to hold good in regard to dentition. An accurate determination of sex differences is not possible at the present time. We need much more comprehensive material for an exact study of the problem. The average time of eruption of the deciduous and of the permanent teeth and the conditions upon which it depends cannot be determined from the material at our disposal.

Besides the sex characteristics, there are other features well worth investigating, and of particular interest from an hygienic point of view. Our three series present peculiar differences. The time of eruption of canines differs as much as two years in the different groups. The time of eruption is latest in Dr. Hellman's New York series. The three series agree fairly well in regard to the time of eruption of the first molar, but for the canines and bicuspid, the New York series appears to be very much retarded as compared to the Boston and the Porto Rico series.

In Porto Rico the eruption of the teeth is very much accelerated. It might seem plausible to assume that the whole physiological development of the body would be accelerated in that tropical country, but this assumption is contradicted by the observations on growth. It is not likely that we are dealing here

with racial differences. Presumably environmental causes determine the differences in period. The same puzzling condition prevails in Dr. Channing's series of mentally abnormal children, among whom dentition seems to be retarded. It seems possible that the decay and early loss of the deciduous teeth accelerates the eruption of the permanent set. If we want to obtain reliable data, the population must be studied, subdivided according to locality, nationality, nutrition of the child, its normality or abnormality, and pathological conditions.

The principal reason why I wanted to bring this matter before you is to invite your co-operation in an attempt to solve these problems. The material that comes under your observation will not give a final solution of the question, because your patients come to you on account of anomalous conditions. Besides these, we need careful observations of school children of different ages among normal individuals. These would enable us to investigate with accuracy the conditions which determine the sequence of the eruption of teeth in the two sexes and the influences of normal physiological and of pathological conditions, and thus we may hope to throw light on the course of development of the individual.

#### DISCUSSION.

**Dr. Milo Hellman**, New York City. It has always been of great interest to me in relation to the practice of orthodontia, to understand and know something more about development and growth. I think the whole question of orthodontic success hinges on a thorough knowledge of the processes involved in development and growth, and their modifications through various pathological conditions.

I have been very much interested in the work of Professor Boas, as reported in his various contributions. My idea last year in bringing Mr. Spier before you was to interest you in this problem.

You cannot imagine how much valu-



able information there is in our possession in the form of our records and casts that will contribute considerably toward the solution of this problem. As professor Boas said, my series showed a retardation of growth. I have a number of cases recorded at various stages of growth, but at the same time the majority of cases were records of cases of malocclusion. I do not mean to say as a final conclusion, because it is as yet incomplete, but if it should prove that all the cases of malocclusion in your hands show finally retarded growth, that will immediately give you a clue to the solution of the problem you are handling all the time. You are striving to establish normal occlusion and normal in its most ideal form. How can you accomplish a thing of that sort, when the whole individual is retarded in its development?

Such information would be of infinite value to all of us, if a point of this character were established; or, *vice versa*, if it were established that retardation in growth may be accelerated through the restoration of normal occlusion, would that not be a remarkable recommendation for doing orthodontia? I cannot urge you too strongly to take a more keen and active interest in this problem and record all the cases you have. Then let Professor Boas have these records and we shall have something in return that will be of infinite value to orthodontia.

**Dr. H. C. Ferris**, New York City. In reference to the point of the development of the teeth, and the time of puberty, I have a case in my practice, a girl, who at twelve years, had a serious illness—diphtheria, followed by pneumonia,—and her development has been retarded. Her teeth have all erupted, except one bicuspid, in which case the deciduous tooth remained. At fourteen years, I radiographed that child and found the cuspid lying in almost a horizontal position. I extracted the deciduous tooth, and waited until she was seventeen years of age. I might say her menses were retarded for two and a half years and then the tooth commenced to

move, and a subsequent radiograph showed the tooth in motion. At seventeen years, the cuspid tooth erupted slightly in lingual occlusion, and by finger exercises on that tooth, she was enabled to bring it in proper relation, and she now has perfectly normal occlusion.

**Dr. W. K. Gregory**, New York City. I have not the good fortune to be an orthodontist myself, and so my remarks may seem a little inopportune. I am a museum man, and the first business of museum men is the gathering of material. They are very covetous people, and whenever they see desirable material they want it, they are anxious to gather it in; but we know that the other man wants to keep his material, too, and sometimes it is a battle of inclinations to get it out of him.

You people have a lot of data, and everybody is willing, in an abstract way, to have other people make use of his data; but from a museum point of view, the difficulty is to devise means whereby that data can be brought into the hands of the investigator. I beg to lay this matter before your Executive Committee, to see if some practical means cannot be devised whereby Professor Boas could get the benefit of your material, and you could keep it at the same time—some system of making duplicates, or having these records copied, or something of that kind.

**Dr. Hellman**. With the aid of Professor Boas, a chart was devised for the collection of the various data necessary in the study of this subject. As I wanted to get something out of the bargain for orthodontia, we made provision for the recording of classes of malocclusion, so as to gather information regarding the general percentage of each class, division and subdivision.

I gave Dr. Stanley some of these charts to be passed around at the Boston meeting, which I was unable to attend. The members ought, therefore, to be familiar with these charts. If you appoint a committee to act on this matter, it would very much simplify the matter. It is in accordance with various statis-



tical methods that this problem will be dealt with and the results will undoubtedly be of considerable benefit and interest to all of us.

**Professor Boas** (closing). I think the problem is a very simple one. All that is necessary at the present time is to collect accurate records of the state of the teeth of the individual, the sex, the age at which the cast is taken, and the birthday. Besides it would be very desirable to have observations on stature

and weight, because they indicate in a way the general state of physiological development. I have a blank, indicating these data, which Dr. Hellman has been using, and if it were possible to place blanks of this kind in the hands of the members of your society, and have them filled out from the observations on your cases and reported to the committee, it would be a very simple way of obtaining the required data.

(To be continued.)

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## Odontological Society of Chicago.

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Regular Meeting, held January 6, 1920.

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A REGULAR meeting of the Odontological Society of Chicago was held January 6, 1920, with the president, Dr. Truman W. Brophy, in the chair.

The President introduced the speaker of the evening, Dr. JULIUS A. TOREN, who read a paper entitled "Digestion."

[This paper is published in full at page 376 of the present issue of the DENTAL COSMOS.]

### DISCUSSION.

**Dr. P. G. Puterbaugh.** We have heard epitomized the whole textbook story of digestion, with therapeutics thrown in. The subject has been very well presented by Dr. Toren, and there is little that I can add to what he has said except to emphasize this: I have come in personal contact with patients who had hyperchlorhydria from eating too much salt; these cases would experience gastric pain following meals, flatus, and eructations of gas, the symptoms clearing up completely by simply cutting down on the excessive amount of salt in the food.

There is something about the psychic influence upon digestion which was not

brought out by the essayist, and it is this: Howell, I think, states in his textbook on physiology with reference to experimentation on cats and other animals, when these animals were provoked to anger or fright it was found that intestinal peristalsis was delayed for a number of hours, and we know that when we have an arrest of peristalsis there is a corresponding arrest of the secretions of the various glands that secrete the intestinal juices and enzymes, so that the psychic factor is one we should consider.

It has been demonstrated conclusively that in order to digest properly we must be in a complacent frame of mind. And then, too, the appetite and appetizing odors of foods are worthy of consideration. Probably most of us have had experience in eating following anger or excitement, or when nauseated by unpleasant odors, and we know that indigestion follows, so that it is something worth considering.

I was interested in what Dr. Toren said about the digestion of meats when swallowed in "chunks." I have been laboring under the impression that food should be triturated in the mouth first

to get a thorough admixture of the saliva in order that thorough reaction should take place between the ptyalin and the carbohydrate material, and that a fine division of all food is necessary in order that the intestinal juices may act upon them. However, I am glad to get that point, because to me it is something new.

I believe generally speaking most of us undermasticate our food. We rush to our meals and bolt our food, and therefore do not get as much out of the digestive function as we should.

I was interested in a newspaper article I saw a week ago in which the statement was made that one caramel possessed sufficient heat units and energy to enable a man to walk a mile. That is worthy of consideration, and it brings up the point that we all probably overeat. Someone said that we should not "live to eat, but eat to live." If we are going to properly digest our food, it is not wise to overload the digestive tract with a lot of food that is unnecessary. It is, however, sometimes advisable to provide bulk of foods that contain a large amount of cellulose in persons who have a tendency to become obese; this will satisfy the appetite and at the same time will tend to reduce the excessive amount of fat.

**Dr. Sidney J. Knowles.** Dr. Toren has concisely presented a subject which I believe is going to be more generally studied in the future than it has been in the past. I believe this is one of the most interesting questions before us today, and I really think the day is not far away when school children will be taught these questions of correct diet, very much as we are trying to do in our dental practice in teaching proper prophylactic measures. This is being done in business by employing legal minds to avoid getting into litigations, the same as we are trying to avoid dental destruction by teaching proper personal care of the teeth. The younger people will be taught in schools in a definite way, that the foundation of one's well-being is proper diet.

Dr. Puterbaugh elaborated a point of great interest to us when he spoke of being in a happy frame of mind, which

has a good deal to do with digestion. I do not suppose there is a profession in which the nervous strain is any greater than that of the man practicing medicine or dentistry, and it is certainly true that the average practitioner of dentistry, who is indoors, with very little exercise, is under great nervous tension, as most busy men are, and the amount of food which normally would be well taken care of is not properly handled, particularly if he is aroused to anger and constantly under nervous strain, which will certainly hinder his digestion.

**Dr. L. L. Davis.** There is just one thought that the essayist touched lightly upon, namely, the tolerance of food by different people. One man can take a greater amount of a certain food than another man, due very largely to, I will not say idiosyncrasy, but that is the term we used to apply to it. But that same food taken by another person would act almost as a poison. If we can derive from Dr. Toren's knowledge of the subject the class of foods we can best tolerate to establish a perfect balance between that which is used and that which is eliminated, it is the one thing we shall all appreciate. We find many of our patients who indulge in too much carbohydrates, more especially the feminine portion of the household who eat so much candy and sweets of all kinds, and invariably we find these people in poor physical condition. Not only do they have indigestion, but their teeth show the result of the same, and the sooner we can place these patients in the hands of physicians like Dr. Toren for a little education along the proper lines, the better. I think it is the duty of the dentist to refer cases of this kind to men of the medical profession who can properly take care of them, and as we specialize more and more the little medical education the dentist may get from time to time from just such essays as the gentleman has presented this evening, the sooner the dental profession will be enabled not only to practice dentistry intelligently but right the errors of their patients.

**Dr. J. E. Hinkins.** It has been my



fortune within the last two years to have had the benefit of the advantage of some agricultural experiments along the line of food values, and while it is not quite germane to the subject, indirectly it is. This work has been taken up for the purpose of fattening stock and for ascertaining food values for race horses, as well as athletes, thereby bettering the condition and nourishment of men and animals. I have been much interested in this work and am not allowed to say as much as I would like to because the work has not yet been completed. This

1 gram protein	5711 small calories	5.7 large calories
1 gram fat	9365 small calories	9.3 large calories
1 gram carbohydrates	4182 small calories	4.1 large calories

work has been followed out along the following line: We first took foods and divided them into two classes, nutrients and non-nutrients or organic and inorganic salts. Then we divided them into proteins, animal fats, vegetables, oils, and carbohydrates. The proteins include all nitrogenous substances except the nitrogenous fats, the ash or bone, that is, the seeds and skins of fruits, and water. Water plays a very important part, but it is not a nutrient. We watched the nutritional value of the three foods in animals as well as in athletes. We get heat and power principally from proteins, and our energy comes largely from the carbohydrates, the oils, and fat. We have found in following these experiments closely that when we have a fairly well-balanced diet of the three ingredients, proteins, oils or fats and carbohydrates, if we take out a certain percentage of proteins and give a little more of the carbohydrates and oils, there will be a kind of give and take. The carbohydrates and oils will draw upon themselves to help the proteins, or an extra amount of proteins and carbohydrates will help to meet a deficiency of the fats and oils. The next step in this work was to determine the caloric or heat unit production of the various foods. I think Stohmann arrives at his results in this way: He takes food in

the proportion of a gram of protein, a gram of fat, and a gram of carbohydrates, and after this food has been weighed and fed to the animal or human being, which usually takes about thirty-six hours, the urine, secretions, feces, and water are weighed and an analysis made. It is marvelous to see the amount we take in, and how little is oxidized—digested.

Stohmann gives the following heat values for protein fat and carbohydrates when completely burned in the calorimeter:

#### PHYSIOLOGICAL HEAT OF COMBUSTION.

Rubner calculates this physiological calorie value as follows:

1 gram protein	4.1 calories
1 gram fat	9.3 calories
1 gram carbohydrates	4.1 calories

Atwater's figures for the different varieties of food corresponding to those of Rubner given above are:

1 gram protein	4 calories
1 gram fat	8.9 calories
1 gram carbohydrates	4 calories
1 gram alcohol	6.9 calories

We have been somewhat mystified about alcohol as a food. It is a heat and muscle producer to a certain extent. If it is used in moderation the alcoholic radicle is very essential, but it cannot be stored up in the body.

Following up this experimental work we have tried different methods of cooking food and also using raw food for developing the animal in the quickest way possible for the meat market, and developing the best food we can get for bone building and for the production of energy and vitality. Most of our meats, when cooked by boiling, lose over 50 per cent. of their food value. If we saved the broth, we saved it all, and gave it back to the human being or animal in



soup, and it is largely the same way with roasted meats. If we roasted meat and saved the drippings, we saved all, but if the drippings were thrown away, we lost half of the value of our meats.

We have also found out some interesting things in regard to vegetables. If you take potatoes and pare them and throw them in water and leave them thirty minutes, you will lose 58 per cent. of the carbohydrate substances and 30-odd per cent. of the inorganic salts.

Those who are interested in this subject would be particularly interested in an article which I read recently on the "Proper Food and Its Relation to the Progress of Nations," by Dr. E. V. McCollum of Johns Hopkins.

**Dr. Frederick B. Noyes.** I have been much interested in the paper presented this evening, which gives us an exceedingly clear and very concise statement of the process of digestion, the laboratory in which the three classes of foods, carbohydrates, fats, and proteins, are digested. They are first broken up and made available for the tissues, and the next step, the building up of the tissue, really does not belong to the paper, but I think perhaps we could include it without going very far wrong, and as Dr. Hinkins has touched upon it, I am going to recall a paper by Dr. McCollum of Johns Hopkins which I heard recently and in which I was very much interested. I thought it was one of the most startling presentations on nutrition that I ever heard. It was logical and beautifully presented, and beginning with the point which the essayist brought up, namely, the handling of the body to produce fats and carbohydrates, Dr. McCollum's thesis was that those sources are not capable of sustaining the animal body. In other words, the mere fact that a food contains the full normal complement in calories derived from these three sources does not necessarily mean that it will sustain life; that the laboratory animal, for instance, fed on a full complement of protein and carbohydrate derived exclusively from muscle cuts of meat and storage tissue of plants, will die; that a rat, for instance, goes through

a certain definite picture, and you can get him to the point at which he is totally paralyzed and will die in three hours, but if you give him a hypodermic injection of butter fat or egg fat, he is then as capable as ever. But deprive the animal of egg fat and butter fat and certain other things, in spite of the fact that he has a full complement of proteins, carbohydrates and fats, he will die. Man is in exactly the same position. In other words, it is not simply the ability of the human organism to digest these substances, but there is a difference in these substances.

He turned to the animals and emphasized the fact that the carnivorous animal does not first eat muscles, but the first thing he goes for is the blood, and next the liver, the kidneys, the pancreas, the active glandular tissue, and then he eats a part of the carcass; that unless the vegetable diet contains in addition to such things as tubers, potatoes, carrots, and grains a certain proportion of leaves and the physiologically active tissues of plants, it will not sustain life. And then he very briefly refers to the types of men and of races that live on a purely meat diet, provided it contains milk, butter, and cheese, and speaks of the races that live on an absolutely vegetable diet, provided it contains a proportion of leaves and roots and growing portions of plants. And then to me the most interesting point of all was his application to the present condition of civilized life, and the things that have gone on in the evolution of modern trade and the development of the milling industries in which the milling concerns, for the purpose of preservation of flour, have eliminated the germ from the wheat flour, and the whole of the husk from the wheat flour, and left nothing but the starch of the grain in wheat flour and cornmeal and all of the flours.

Dr. McCollum noted the fact that at the present time a startlingly large percentage of our industrial population are living on muscle cuts of meat and white bread, a deficiency diet, although it contains the full complement of protein, carbohydrates, and fats. Then he illus-

trated that further by citing sections of the country in the South where tuberculosis and pellagra are the worst, and said just in proportion as the milk consumption is reduced, those diseases are increased.

His last illustration was perhaps the most startling. He cited an orphan asylum in Baltimore for colored orphans, describing it as located in large grounds, with beautiful surroundings and beautiful trees, the building as well cared for as any hospital, the children sitting down to bountiful meals, and getting up with their stomachs filled, every meal containing the full complement of proteins, carbohydrates, and fats, but in that institution the death rate is more than 25 per cent., chiefly from tuberculosis. He took under his care a small group of those children and added to their diet a large proportion of milk and cream and butter, and I can only give you one instance to show the change, that of a boy, six years of age, who weighed only twenty-five pounds, yet at the end of two months with the additional diet he had gained thirty pounds in weight. In spite of the handling of protein and things which contain food value purely from a calorie standpoint, we may have and do have in this country at the present time large areas in which the individuals are living on a deficiency diet. And I think as we look around among our own acquaintances and among our own patients, it may be found that sometimes while they are having an abundant diet, they are really on a deficiency diet because of lack of certain things which in small quantities are essential for the nutrition of the body, whether they are supplied with the other chemical elements or not.

**Dr. J. G. Reid.** We have been taught for a number of years that mastication is a very important part of a man's living; that the thorough mastication of food is very essential if we are going to live a long time.

In the construction of artificial dentures we have been led to believe that if a man could not chew meat with them he was not long for this world. If I

understood the essayist rightly, we do not have to masticate our meat, but the salts take care of it. I have always believed, and still maintain, that the average human being, as we are living today and have lived in the past, overloads those organs that are made for digestion. We eat too much, and the simpler the diet and the more digestible it is, the greater the longevity of the individual, relatively speaking.

**Dr. C. N. Johnson.** I want to pay my tribute to Dr. Toren for the excellent presentation he has given us on this subject. I am not qualified to discuss the physiology of digestion, but I want to raise a question which I would like Dr. Toren to take up in his closing remarks.

In dentistry today we are making very prominent the subject of oral hygiene as it relates to the health of the individual. We are taking mouths that have been neglected, with deposits upon the teeth, with hypertrophy of the gums, and we are caring for those mouths, removing the deposits, trying to clear up any pathology that may be there, and we believe that as the result of treatment of that kind we are improving the digestion of many of our patients; at least we are improving their physical well-being. The question I want to place before Dr. Toren is this: Can he tell us what it is that causes the clinical change which we observe in these individuals as the result of oral hygiene, and can he give that in terms that will be understandable to us as it affects digestion?

It seems to me we are doing a very definite good to our patients in cleaning up their mouths, and if we are, I wish Dr. Toren could tell us something about the *modus operandi*.

**Dr. Truman W. Brophy.** In the early part of his paper, Dr. Toren made reference to the value of more training among dentists on the subject he presented this evening. We all appreciate that very much. We all appreciate the value of more training in certain departments of general medical subjects, and in this connection I would like to



say that after having sat on the benches of both medical and dental schools and taught in both for many years, I think I can say without the slightest prejudice in any way that medical students should get a broader and more thorough understanding of the diseases in and associated with the mouth, especially in the field of dental surgery. I am not going into that, because it does not in any sense become proper to divert from the real topic of the paper.

In the work I do, which is largely plastic surgery of the mouth and face, I find that the best men who have been graduated from the best medical colleges in this country show that their training in this particular field has been extremely deficient.

As to diet, I think it is one of the most important subjects before the medical profession today, and when we enter into a discussion over it I think we should as medical men try to arrive at some plan by which people may have an opportunity to become familiar with the subject. It happens to be my duty to deal a great deal with children; in fact, nearly all of my work is with children, and one of the most important things in connection with them is diet. It goes without saying that the one thing young mothers know the least about of all things is diet in the care of their children. If our friend, Dr. Toren, in the enthusiasm of his youth and the enthusiasm of his work, can devise a plan by which his teaching shall make a most profound impression upon mankind, it will be in gathering together the young women and teaching them the necessity of becoming acquainted with diet. It seems to be a false notion on the part of mothers that the girl shall grow up and go to school and learn to play the piano and learn to dance, and other things, without teaching her the most important subject of her life, namely, how to take care of and feed children. Young mothers, as a rule, know absolutely nothing about the feeding of children. They do not know how to prepare the food in the event of their being unable to nurse their children. The

children really starve, or they get into a state of gastro-intestinal irritation without their mothers knowing why they become so.

I think Dr. Hinkins and Dr. Noyes would do the country a great service, particularly the city of Chicago, if they would get busy on the subject of milk, and teach a lot of politicians that milk is the most important of all diet. It has often been said that milk is the only food that contains all the essentials of a food. The young infant in the first hours of its life lives on milk, and the aged individual can take milk better than any other food and thrive on it. I have suggested that because I like to be practical, and I think the subject of food in its relation to infants should be taught more generally and better than it is being taught today. If it were better taught, we would not have so many ill people. All the children I have coming into the hospital for treatment, 75 or 80 per cent. of whose mothers have no milk for them to live on, are ill and suffering from gastro-intestinal disease. Why should this be so? Have we not advanced far enough in the work of studying the necessities of these children to make a better record than that?

Acidosis is one of the great troubles we have to contend with in children, and methods must be employed to overcome that condition.

**Dr. Toren** (closing the discussion). A number of questions have been asked, and a number have been suggested. Some of the things that have been mentioned we would like to elaborate upon a little. Of course, we tried to limit our paper strictly to the subject of digestion. There are many things aside from those which we mentioned therein which might well be considered.

Most of us are prone to think of ill people as suffering from single, isolated, specific conditions, and most physicians try to treat people for single, isolated specific conditions with so-called "specific" remedies. We believe this to be a great mistake.

Among all the people who have suffered from typhoid fever, there are no



two of them who have been sick in exactly the same way, because no two of the people who suffer from typhoid are alike. Pathology anywhere in the body results in the production of either aberrant physiology or pathology elsewhere in the body. The conscientious and capable physician is the one who endeavors to treat his patients from every standpoint, not for a specific condition but for the state of affairs in which he finds them. Every sick person is sick as the result of an abnormal state of affairs, and what we want to do is to correct that abnormal state. Anything which we can do to bring about such a result should be attempted. For instance, in relation to the matter of proper digestion, Dr. Puterbaugh mentioned the effect of emotion. It is an easily demonstrable physiologic fact that, if one eats a hearty meal, under normal conditions the stomach will empty itself in from four to four and a half hours. If, however, the individual after eating this hearty meal is subjected to one of the depressing emotions, such as fear, anger, or sorrow, the secretion of the gastric juice stops instantly, and it is four or five hours before it begins again, regardless of whether the emotions that stopped it are removed or not. This fact has been demonstrated many times, and illustrates the profound effect of the emotions upon digestion; hence the great value of having laughter and cheerfulness at the table.

In regard to mastication, I might dwell a little on Professor Hawk's experiments along these lines. He experimented with a group of young men who were perfectly healthy individuals with apparently normal digestion, and it was found on comparison of the meat eaten in large masses or in as large "chunks" as could be swallowed with food that was chewed finer, that the masses or "chunks" were the better digested. The meat was eaten both raw and broiled.

In regard to milk, we have been laboring under the delusion of one of our grandmothers' injunctions for many years, and, supposing all along that milk which was sipped was precipitated in

smaller and more flocculent curds than milk which was gulped down, we have been carefully sipping our milk. Dr. Hawk found that milk gulped down as rapidly as it could be swallowed was precipitated in much smaller and finer curds and was better and more quickly and easily digested than milk which was sipped. That brings us to one point which we would like to emphasize: We have been laboring under so many delusions in regard to these things that we are trying now to put things on a demonstrable basis—in other words, to get down to "brass tacks." The whole field of digestion has been veiled in obscurity for so long that we are trying to eliminate some of that obscurity. The diagnosis of diseases of the digestive organs in the past has been based very largely upon the patients' symptoms. So far as symptoms are concerned in the differential diagnosis of gastro-intestinal diseases, they are worth practically nothing. One has about a "fifty-fifty" chance of guessing right. We do not think 50 per cent. is quite a good enough percentage of correct guesses, and I believe patients do not think so either. The only way I know of by which gastro-intestinal derangements can be diagnosed with any degree of accuracy is by a careful and thorough investigation of the case, making an analysis of the available secretions and dejecta. Incidentally I may say that the quantitative analysis of the twenty-four hour specimen of urine is absolutely essential to a thorough understanding of digestive function in any particular individual, and a careful microscopic examination of the gastric contents and stools as well. If we know what is going in, if we recover what we can of it after it has been in a while, and if we find out what is being eliminated, we can come pretty close to knowing what that individual's digestive function is.

So far as malpositions of the viscera are concerned, the X-ray renders us invaluable aid. The barium meal when carried out in a certain particular way gives us very valuable information. I may say in this connection, that in giv-

ing the barium meal my preference is to have one picture in the erect posture at fifteen minutes, and one picture in the prone position at fifteen minutes. This gives us the degree of mobility of the stomach; it gives us the contour of the upper portion and fundus of the stomach, and we begin to get the peristaltic waves. Another picture prone at the end of one hour gives us the filling capacity of the head of the stomach, that is, the pyloric portion; another picture at six hours determines the degree of motility of the stomach, that is, the emptying power of the stomach. Normally the stomach should be emptied of the barium meal at the end of six hours. It will give us the condition of the duodenum. For instance, if we have an ulcer in the duodenum, we will have a retention of a certain part of the barium meal at that point, it being embedded in the ulcerated area. Another picture at the end of twenty-four hours will give us a good idea of the motility of the large bowel. The large bowel is to be blamed for a great deal of illness today.

As mentioned in the paper, most of us do not exercise sufficiently to maintain proper bowel function. Many people suffer from ptosis. Any individual who has a measurement from the crest of the pubes to the suprasternal notch of more than twenty-one inches has a ptosis. Most people who have ptosis do not suffer any inconvenience therefrom, but every once in a while we find an individual who will have a kinking of the bowel, a mechanical condition interfering with the proper function of the bowel, and then we have a mechanical condition to deal with rather than a chemical one, such as we have considered in our paper.

To my mind, the principal ill effect of undermastication is that it favors overeating. Any individual who masticates his food thoroughly is not likely to overeat. Too much concentrated food is being eaten. We live on concentrated foods, we eat an insufficient bulk. When we think of the large bowel as a large tube that moves its contents along by virtue of contraction principally of the circular muscular fibers, we begin to ap-

preciate that we must have a certain bulk within that bowel if we are to have its contents moved onward, because this large tube cannot contract on a small content and move it to any great extent. There must be volume to it, consequently I am a strong advocate of bulky foods. We believe in a general mixed dietary. Man is neither carnivorous nor herbivorous; he reaches his maximum efficiency on a mixed diet, but by that we do not mean a concentrated diet, such as most of us live upon.

Most of us professional men make a great mistake, particularly those of us who are down town all day, as all of you are. A patient comes in as we are about to depart for our lunch, and rather than disappoint that patient we consent to see him or her, and half an hour is gone, and we make up the difference by gulping our food down in half an hour, while the patient goes on his or her way and takes a full hour for lunch. That is a mistake on our part. Every man who works indoors all day should take a full hour for his noon meal. He should eat somewhere where he can get quick service, so that he can rest the balance of the hour after he has eaten his meal, especially after rather than before the meal, and not go in somewhere and sit down for three-quarters of an hour before he is served and then gulp his food and run back to the office. I am glad to get this chance to hammer this point home to professional men, because I know a good many of you do not take the proper length of time for your lunches. You are making a great mistake in that regard.

Dr. Davis brought up a point of great value, and that is the functional capacity of various individuals in taking various foodstuffs. It is a well-known fact that certain kinds of food contain substances which are toxic to some individuals. As a matter of fact, all foodstuffs contain substances that are toxic to all of us. They are inherent parts of the food we cannot get away from, but the normal average individual has either a natural or acquired ability to take care of these toxic substances, and I believe



it is this tolerance for these toxic substances in foods which accounts for the varying ability of people to eat certain things. As a common illustration of that I might cite the matter of strawberry rash and the inability of many people to eat eggs, matters which are common knowledge to every one.

In regard to the matter of candy eating, we believe it to be most reprehensible. We believe that the promiscuous feeding of candy to children is extremely bad. There is a way in which children can get plenty of easily available carbohydrates to supply their enormous expenditure of energy, and that is through the eating of simply made cakes and cookies, which are infinitely better for children than candy, because they are getting a lot of other substances along with it to dilute the concentrated sugar, and the children are just as well satisfied with simply made cakes or cookies as they are with the candy.

So far as candy eating in adults is concerned, it is a dangerous proposition. The eating of candy is being indulged in tremendously today because of the fact of prohibition having gone into effect. It is a well-known fact that a person who has been addicted to the use of alcoholic beverages and has stopped using them has a tremendous craving for carbohydrates, and attempts to satisfy that with the most concentrated of all foods—sugar. Today, clinically, we are finding an increasing number of patients who are suffering from sugar intolerance. Some of them we call diabetics because their sugar tolerance is so extremely low and very intractable. There is a large class that cannot properly be called diabetics, and we prefer to term those individuals as suffering from liver insufficiency. The glycogenic function is a most interesting one. Practically all of the carbohydrates are reduced to the form of glucose before being absorbed. This glucose is taken up in the blood stream, and carried through that great filter, the liver. In the liver, a large part of it is converted into an insoluble sugar known as glycogen, which is stored in the liver and again

transformed back into glucose and liberated therefrom to the blood stream to supply the body needs as requirements demand. Whenever the liver fails to store up glucose as it should, we have what is known as carbohydrate intolerance, and these cases of carbohydrate intolerance are showing up in increasing numbers since prohibition went into effect. These livers are always somewhat larger than normal; they are groggy, and more or less tender. The flow of bile is more or less interfered with, and the bile is thick and viscid in character; not easily passed through the bile ducts. The liver is congested with blood; the flow of blood through the liver is impeded. The point of importance in these cases is to improve liver tolerance. Anything which will bring about an increase of liver function will take care of this very nicely, and we have to bear in mind that the two great functions of the liver go together, that is, the production of bile and the glycogenic function. When one is impaired the other is almost invariably so. Many of these cases are not easy to right, but the matter is essentially one of treatment of the liver rather than the correction of the dietary.

Dr. Hinkins brought up the matter of water with food. Another thing our grandmothers taught us was that we must not drink with our meals. This idea is absolutely wrong. It has been proved conclusively that the drinking of water with meals favors digestion. Again, a person who does not drink water with the meals is unlikely to take sufficient water between meals to take care of the body needs, and when we stop to compute the large amount of water required every twenty-four hours to maintain our emunctories in proper condition, counting up the loss of water through perspiration, through the moistening of inspired air, through the loss by way of urine, and the amount lost in the stools, we begin to realize that one needs a good deal of water. Many people do not drink enough water. Of course, we do not advocate drowning the body with water or waterlogging the whole system, but we do believe the



drinking of water with meals will tend to insure the imbibition of a sufficient amount of water every day to maintain that individual's needs.

The subject of alcohol was brought up. I have always been, not a prohibitionist, but a believer in moderation in the use of alcoholic beverages. We have to admit that alcohol has its virtues; in moderate amounts, taken with the meal, it greatly favors the flow of gastric juice, particularly when used in the form of beer and ales.

Alcohol performs another great function in those conditions which are associated with hyperpyrexia. When we have hyperpyrexia the digestive function practically ceases. If we try to feed that individual, the food either will not be tolerated or it will cause an increase in the temperature, either of which is bad for the individual. A high temperature burns a large amount of body tissue. The administration of alcohol in very small and frequently repeated doses will act as a very marked saver of body tissues. In this condition it has one of its legitimate fields of usefulness, and under these conditions may be given to the smallest child without any harm whatsoever.

In regard to the loss of food value that Dr. Hinkins mentioned in connection with vegetables which have been cooked, this loss in carbohydrate particularly we make use of clinically in cases of diabetes by cooking the vegetables twice. The first cooking will take away a large amount of carbohydrates, the second cooking leaving the food practically free from carbohydrates. Incidentally, such preparation also renders the food extremely unpalatable, which is the only drawback. In treating diabetes twice-cooked vegetables are valuable in furnishing the individual with a sufficient bulk of food to care for the hunger, filling up his stomach, relieving the distress of hunger contractions of the stomach without feeding him any carbohydrates.

I was greatly interested in Dr. Hinkins' and Dr. Noyes' report of the matter of investigation of food values. It

occurred to me that possibly the phenomena which were described might be attributed to those peculiar and chemically little-known substances which we call vitamins, the lipoids and nucleins. We know these substances are absolutely essential to the maintenance of life. We know that the foods which many of us are eating are practically free from these substances. Every growing child must have either milk or eggs or both. Some children have an intolerance for eggs, so that we are thrown back on milk. I have not yet seen a child who could not drink milk. Some adults cannot, that is, they think they cannot. Their inability to tolerate milk is usually due to the fact that the liver function is so impaired, the output of bile salts is so low they are unable to take care of the fat of the milk properly, and the same thing applies to cream and butter. Most of these people are able to take care of skimmed milk or buttermilk with perfect ease.

We are great believers in the crude foodstuffs. We do not believe in the overcooked mixed up "messes" that are so commonly seen on our tables. The more nearly a food can be eaten in its natural state the better it is for the individual; it maintains the digestive function at its greatest efficiency; it furnishes the greatest amount of food value, and is the most conducive to his welfare.

A simple diet is the ideal thing, a point brought out by Dr. Reid. In regard to the preparation of various foods, as mentioned in the paper, raw meat is most digestible. The next best way to prepare meat is by broiling it. Sometimes we need to use meat without the extractives. In that case boiling will accomplish the purpose, but here again we lose the gelatins and the gelatin-forming substances in the meat which are of such great food value. We do not believe in the extensive use of canned and pickled preservations of vegetables, as is done nowadays. A much better way of preparing or preserving vegetables is by drying. The entire food value remains unimpaired. The flavor is better, as a rule, than that which has

been preserved in cans in a moist state. The cost of preparation, the cost of shipment, etc., are very much less, and the foods are almost as easily prepared for consumption as those which have been put up in cans. We would like to advocate the drying of vegetables for preservation.

Dr. Johnson brought up one subject which is of the utmost importance, and that is the matter of clean mouths. It seems to me that dentistry of the last thirty years has been entirely wrong; we have been trying to save teeth, or advocate the saving of teeth that were dirty, foul, miserable snags, in individuals who would be infinitely better off without them.

The first essential with regard to dental procedure should be cleanliness of the mouth. The question was asked as to why cleaning up of infected mouths brings about an improvement in digestion. We believe that this improvement may be accounted for in a number of ways. A person who has an infected mouth, whether it be infection of the alveolar process or due to a root abscess (it does not make any difference where it is), is a sufferer, as a rule, from a pretty severe toxemia. Through the very nature of the structures involved, drainage is into the blood stream in a very large percentage of cases. In another paper I have taken the liberty to quote Dr. Noyes' monumental work on the study of the lymphatics of the mouth and teeth. It explains many of these things which we did not appreciate before because we did not know this anatomical fact. This toxemia brings about a number of changes slowly, over a long period of time in the chronic cases. There is a depression of mentality which is very noticeable in some cases. One man in the East reports a number of cases of insanity having been cured by cleaning up infected mouths. Only recently we had a man in the condition of profound melancholia who was entirely cured by having the mouth infection cleared up. This toxemia brings about an alteration in the blood stream:

such individuals almost invariably suffer from a greater or less degree of anemia. When we have anemia we have two things happening so far as digestion and assimilation are concerned; we have a deficient oxygenation of the tissues with diminished oxidation of our foodstuffs and an impairment of the digestive secretions, and these things tend still further to impair the individual's nutrition.

With reference to the remarks made by Dr. Brophy, I expected him to speak in the way he did, and I may say in this connection that next week we are going to get after the medical men on the subject of mouth infection. They certainly need information. The average physician knows little or nothing about the teeth or diseases and conditions connected with the mouth. It is a lamentable but very actual fact. I wish that physicians might be informed more fully along these lines. It is up to the dental profession to do it. Those of us in the medical profession who appreciate some of these things, not as fully as you do but to a certain extent, are trying to do our bit in informing the medical profession. Primarily it is a part of your duty as well as of the medical profession to co-operate more closely on these things, because they certainly play a very important part in the practice of medicine. We have been able to do much more for our patients since we have been getting after mouth infection than we were ever able to do before.

The matter of education in the fundamentals of living is a crying need today. The tendency in the past, as Dr. Brophy has said, has been to teach dancing, piano playing, and the dead languages, and a lot of other things which are essentially useless. We need to teach our young people how to live their lives in more practical ways. We believe the teaching of chemistry and physics is more desirable to any individual boy or girl, than the dead languages and higher mathematics can ever be.

Adjournment.

# THE DENTAL COSMOS

A MONTHLY RECORD OF DENTAL SCIENCE.

*Devoted to the Interests of the Profession.*

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PHILADELPHIA, MARCH 1920.

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## EDITORIAL DEPARTMENT

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### The Scientific Investigation of Dental Materials.

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IN this issue we publish, by permission of its Director, a report from the National Bureau of Standards on certain phases of the amalgam problem. The report is voluminous and technical and, like analogous reports of scientific investigations relative to dental problems, will be of interest to but a limited number of readers. To students of the chemistry and metallurgy of amalgams and amalgam alloys it will contain matter of absorbing interest, dealing as it does with the fundamental principles which characterize the formation of these important alloys, and emanating from such an acknowledged authoritative extra-dental source, unbiased by personal, professional or commercial interests, it is sure to com-



mand the thoughtful attention and consideration of specialists in this particular field.

When in 1895 we published the pioneer investigations of Dr. G. V. Black on the same topic we were favored with a volume of criticism, friendly and otherwise, to the effect that studies of that type were "too scientific" for the average reader, it was "over their heads" and much more to the same purpose. But if it was "caviar to the general" it was solid intellectual nourishment to those who realized its significant importance, and when in due course the principles elucidated by Dr. Black came to be interpreted in terms of practice, then the value of his pioneer studies became clearly evident to all who appreciated the general improvement in amalgam alloys thus made available to the whole dental profession.

The same state of affairs characterized the publication of the work of Miller on the origin of dental caries and the human mouth as a focus of infection. As reports of scientific laboratory research Miller's papers were read by the few who were interested in his field of study from the scientific standpoint. But when his generalizations came to be applied in practice as the foundations of oral hygiene, the prophylaxis of tooth decay and the treatment of systemic disorders arising from dental focal infections, the dental profession of the entire world awoke to a realization of the fundamental importance of subjecting these dental problems to the precise methods of investigation of scientific research work.

The failure to comprehend the value of scientific research work by the self-styled "practically minded" type of individual is mainly due to his lack of understanding of the purpose and character of scientific research and of the difference between pure science and applied science.

Pure science seeks by precise methods to determine the truth by elimination of error and to thus discover the relation of cause and effect in certain orders of phenomena. Applied science is the utilization of the underlying principles or natural laws governing phenomena in their application to the needs of man as expressed in the arts and manufactures.

Applying these considerations to the case in point, the work of Black and his contemporaries on the amalgams left much to be determined by subsequent investigation. Moreover, before the

work of any investigator can be accepted as a final exposition of the truth it must pass the crucial test of revision by other equally competent investigators. Many questions bearing on the composition, treatment and behavior of amalgam alloys have arisen as the result of practical experience in their manufacture and use since the earlier investigators published their findings. Such questions have been demanding settlement to the end that a higher degree of perfection and greater satisfaction in the practical use of these important alloys may be attained.

It is therefore matter for congratulation that the National Bureau of Standards has entered upon this work and has given earnest of its intention to continue it in directions relating to dental materials other than amalgams.

It is manifest that the interest of our National Government in this important field is one of the many outgrowths of the war experience during which the Government was a large consumer of dental material to meet the requirements of its Army and Navy Dental Corps.

The day of empiricism in connection with these materials and their use is rapidly passing. The practical interest of our Government in placing the development and production of all of its material requirements upon a scientific basis is rapidly sounding the death knell to empiricism and rule of thumb methods in all departments of the arts and manufactures. So far as dentistry is concerned the result is one devoutly to be desired, and the *motif* which is manifest in the amalgam report by the National Bureau of Standards should be accepted as one more of the many impulses, and a most potential one, which is helping to develop dentistry as a scientific profession.

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#### Death of Dr. James McManus.

WE regret to announce the death of Dr. JAMES McMANUS of Hartford, Conn., on February 9, 1920. A full obituary notice will appear in the April issue of the DENTAL COSMOS.

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## BIBLIOGRAPHICAL

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ZAHNHEILKUNDE UND MUNDKRANKHEITEN IN IHREN BEZIEHUNGEN ZU ORGAN UND ALLGEMEINERKRANKUNGEN (Dentistry and Oral Disorders in Their Relation to Organic and General Diseases). Einkurzes Lehrbuch für Studierende der Zahnheilkunde und Zahnärzte. By Professor Dr. ALBERT ALBU, Privatdozent für innere Medizin an der Berliner Universität. Mit 37 Abbildungen. 208 pp. Leipzig, 1919. Verlag von Georg Thieme. In cloth, 9 marks plus 40%.

This little book is very interesting because it emphasizes an aspect of dentistry which has been neglected in recent years. The recognition of oral disease as a factor in disease elsewhere in the body has for the time being overshadowed the converse of this relationship. From the dental standpoint exclusively, it is more important that the practitioner appreciate the rôle of the systemic condition, as a whole, and of general disease in determining and influencing oral lesions. The contents of this book represent material and experiences gained in a series of lectures given by Albu since 1890.

The paper is of poor quality, and possibly this partially accounts for the general unsatisfactoriness of many of the illustrations. Figures 27, 28, and 29 are useless, except possibly the gelatin stabs of Figures 28 and 29. Figure 30, on p. 116, is upside down. Figure 14, on p. 63, is mislabeled, there being a

confusion between Friedlander's pneumobacillus and Frankel's pneumococcus. Another minor bacteriological error is on p. 31, where streptococcus pyogenes is referred to as streptococcus pyogenes aureus, indicating a confusion with staphylococcus pyogenes aureus. "Fletscher" (p. 110) is the germanized form of Horace Fletcher. On p. 125, "dentin" is used where "cementum" properly belongs. On p. 203, the adjective "transient" (vorübergehende), applied to a condition of necrosis, seems scarcely logical.

Apart from these minor and for the most part almost mechanical errors, there is extremely little in the content of the book to which exception might be taken. Mercurial stomatitis is given as distinct from Vincent's ulcero-membranous stomatitis, although the former condition is due to an infection with Vincent's organisms, of tissues whose resistance has been lowered by the elimination of mercury. Fundamentally and clinically there is no distinction between these two lesions.

It is rather unusual to find Ludwig's angina described under the heading of "Stomatitis" (p. 134). Albu justifies this by ascribing the glandular involvement to an invariably preceding stomatitis. On the contrary (p. 144) post-operative parotitis is considered to be a metastatic (hematogenous) infection. The correctness of this is very dubitable in the light of the work of Deaver and of Collins (DENTAL COSMOS, 1919, pp.



424-5). The statement on p. 201 that nitrous oxid (with or without oxygen) is one of the most unsuitable and dangerous of the narcotics will scarcely be accepted by the American dentist and surgeon.

The first 100 pages are occupied with descriptions of clinical methods and their interpretation in the diagnosis of the chief diseases of the internal organs, of the blood, of metabolism, and of the infections. This is followed by a consideration of the special pathology of the structures of the mouth, with a small section on the diseases of the pharynx. A final section deals with anesthesia and the contra-indications of the particular anesthetics. The attempt to compress such a wide range of topics within the limits of 208 pages makes of the book little more than a catalog with more or less formal definitions. Even at this, the work serves a most useful purpose in calling to the attention of the profession many conditions and many phases of dental practice which at present need much emphasis. A small but excellent bibliography is appended, which may be used to overcome in part the brevity and superficiality of the book.

### Books Received.

Books received are acknowledged in this column, and such acknowledgment must be regarded as a sufficient return for the courtesy of the sender. Selections will be made for review in the interests of our readers and as space permits.

"A Practical Treatise on Fractures and Dislocations of the Jaws." For Students and Practitioners. By CHALMERS J. LYONS, D.D.Sc., Professor of Dental Surgery, University of Michigan; Associate Surgical Staff University Hospital; Member of Staff St. Joseph's Hospital, Ann Arbor, Michigan. 1919. Published by The Ransom & Randolph Co., Toledo, Ohio.

"Resumo de Prothese Dentaria." (Résumé of Prosthetic Dentistry.) Coordenado por Dr. PEDRO B. GOMES DE FREITAS, Doutor em Cirurgia Dentaria Pela Universidade de Pennsylvania, Philadelphia; Professor da Faculdade de Pharmacia e Odontologia de Pelotas; etc. 1919. Off. Typ. do Diario Popular, Pelotas.

"A Hygiene Bucal nas Escolas Sua Importancia e Necessidade." (Importance and Necessity of Oral Hygiene in the School. Pelo Cirurgião-Dentista PEDRO VERISSIMO, Da Faculdade de Pharmacia e Odontologia do Ceara. C'est par la bouche que l'inspection sanitaire devrait commencer. Dr. Lucien Descaves. Fortaleza: Typ. Moderna-Carneiro & C., Rua Barão Rio Branco—130. 1918.

"Nos Dominios da Odontologia," por FREDERICO EYER, Professor de clinica odontologica na Faculdade de Medicina do Rio de Janeiro. Livraria Editora: Leite Ribeiro & Maurillo, Rua Santo Antonio, 3—Rio. 1919

"Periodontal Disease and Its Treatment by Ionic Medication. By ERNEST STURBRIDGE, L.D.S. (Eng.), D.D.S., Author of "Dental Electro-Therapeutics," Contributor on Dental Electro-Therapeutics in "The Science and Practice of Dental Surgery," on Ionic Medication in Prinz's "Dental Materia Medica and Therapeutics," Fellow of the Royal Society of Medicine, Member of the British Dental Association, etc. Illustrated with 66 Engravings. Lea & Febiger, Philadelphia and New York. 1919.

"Professional Denture Service." By GEORGE WOOD CLAPP, D.D.S., and RUSSELL WILFORD TENCH, D.D.S. With an introduction by J. LEON WILLIAMS, D.D.S., F.R.A.S. 1918. Published by The Dentists' Supply Co., 220 W. 42d st., New York, N. Y.

"Modern Dentistry for the Laity and Industrial Dentistry for the Corporation, Modern Preventive Dentistry and Industrial Welfare Dentistry." By ALFRED A. CROCKER, Cincinnati, Ohio, 1920. Third Edition. Published by *The Dental Register*, The Magazine of Dentistry, founded 1847, pioneer dental journal of the United States. Cincinnati, Ohio.

"Everyday Mouth Hygiene." By JOSEPH HEAD, M.D., D.D.S., Dentist to the Jefferson Hospital, Philadelphia. 12mo of 67 pages, with 39 illustrations. Philadelphia and London: W. B. Saunders Company, 1920. Cloth. \$1.00 net.

"The Systematic Development of X-ray Plates and Films." By LEHMAN WENDELL

B.S., D.D.S., Chief of the Photographic Work, Instructor of Prosthetics and Orthodontia, College of Dentistry, University of Minnesota. Illustrated. St. Louis: C. V. Mosby Co., 1919. Price \$2.00.

"The Nose, Paranasal Sinuses, Nasolacrimal Passageways, and Olfactory Organ in Man." A Genetic, Developmental, and Anatomico-Physiological Consideration. By J. PARSONS SCHAEFFER, A.M., M.D., Ph.D., Professor of Anatomy and Director of the Daniel Baugh Institute of Anatomy of the Jefferson Medical

College of Philadelphia; formerly Assistant Professor of Anatomy, Cornell University Medical College, and Professor of Anatomy, Yale University Medical School. With 204 illustrations, of which 18 are printed in color. Philadelphia: P. Blakiston's Son & Co., 1012 Walnut st. Price, \$10.00.

"The Microscopic Anatomy of the Teeth." By J. HOWARD MUMMERY, D.Sc.(Penn.), M.R.C.S., L.D.S.(Eng.). London: Henry Frowde, Oxford University Press; Hodder & Stoughton, Warwick Square, E. C. 1919

## PRACTICAL HINTS

This Department specially welcomes the brief presentation by our readers of any novel suggestions or methods which in their own practice have proved to be time-saving or to possess other features of advantage.

### A Fixed Bridge with Tilted Abutments.

By BERNARD FISCHLER, D.D.S., Brooklyn, N. Y.

THE loss of the lower sixth-year molar, together with one or more neighboring teeth, will usually cause the remaining molar to tilt anteriorly at an extreme angle, necessitating the cutting down of half the tooth in order to attach a bridge.

FIG. 1.

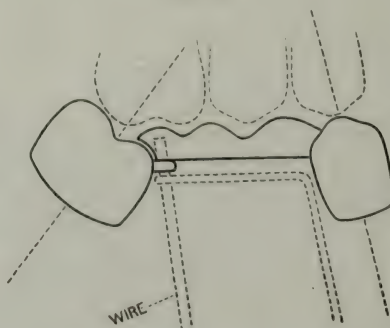


To avoid this, a fixed sanitary arch bridge in two sections can easily be made.

Two gold shell crowns are made and fitted as abutments. An impression is made with the crowns in the mouth and a bite is taken and the case mounted on an articulator. An attachment for the

mesial side of the molar crown is made of 12-gage half-round gold and platinum clasp-wire as follows:

FIG. 2.



Bend the wire so that the flat sides will face. (Fig. 1A.) Cut off the loop and fit it around the original piece of wire. Squeeze with cone socket pliers

to make a tight fit but not enough to bind. Cut off about a quarter of an inch of the original piece of wire and you have a hook and eye attachment. In order to get the eye attached to the crown in the proper position and angle, bend a piece of copper wire (Fig. 2) with the ends parallel to the axis of the anterior tooth. Wax the wire temporarily in position and fit the eye over it snugly to the crown. Wax the eye to the crown and remove the wire. (Fig. 1b.)

Before breaking the molar crown from the model for soldering, heat some modeling compound and cover the posterior portion of the crown and as much of the model as possible so that you will be able to return the crown to its proper position on the model, the impression acting as a guide.

The arch is made as follows:

The cusps of porcelain teeth are squeezed into moldine and melted inlay wax poured into the impression. The wax cusps are removed, washed and waxed upon the model in proper articulation. The half-round piece of wire is now heated and pushed through the eye from underneath into the wax cusp. The wax arch containing the wire is detached, invested and cast, using scrap gold. The cast arch is then waxed to the anterior crown after being placed in its proper position, invested and soldered.

It is best to cement both crowns into position at the same time, thereby insuring the proper adaptation of the sections to each other before the cement has set.

120 REID AVE.

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## Gold Foil in Anterior Bridges.

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By F. H. ENTRIKEN, D.M.D., Walla Walla, Wash.

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RESEARCH of the past few years in regard to devitalizing teeth and the resulting focal infection makes it imperative that the construction of bridges should be as conservative as possible of the abutment teeth. Already great strides have been made in this direction.

One of the first attachments for anterior bridges having this principle in mind was what has been variously called the Tinker crown, the three-quarter crown, the Carmichael crown, the staple crown or inlay; and I suppose other names. But regardless of name, most dentists are familiar with the principle of using the lingual, distal and mesial surfaces for the attachment of gold and I will not dwell on this.

I believe that most of us have been in the habit of using two of these open-

faced crowns for a bridge, where one tooth is missing, so as to insure against the force of leverage on the dummy tooth. There seems to be no argument against this principle, but everything seems to go to prove that there should be insurance against this leverage that destroys bridges and teeth where only one tooth is used to support an adjoining dummy tooth.

It is with this in mind that I wish to offer an improvement on this type of bridge. At least I have never seen or read of this method being used.

We will assume that an upper lateral incisor is extracted. Make an open-face type of attachment on the adjoining cuspid. Now if there is not a cavity in the distal surface of the adjoining central incisor, cut a perfect approximal



cavity for a gold foil filling. Extend well to lingual and gingival.

Now having ideal access on account of the missing lateral incisor insert a perfect foil filling and mallet well for condensation. While inserting the foil, contour the filling so that from the lingual surface there will be a cavity in the gold filling. Polish the filling and shape the cavity in it so that wax will draw from it from the lingual surface. See that there is a depression in the base of the cavity in the gold filling to give the resulting cast rest a firm seat.

Having shaped a cavity in the gold filling, make a wax pattern and cast an inlay to fit it, leaving the sprue extending from the inlay to solder to. This cast inlay rest may be cast of clasp gold to give strength. Place the attachment on the cuspid and the inlay rest in the cavity in the gold filling. The lug will be held securely in place if varnish or collodion is wiped in the cavity first.

Now having the attachments in place, take the bite and an impression. The impression should be taken in com-plaster or some like material so that the impression will be easy to separate from model. Solder in a facing and polish, and you have a bridge that is cemented securely at one end and has a definite

rest in a filling that has anchorage in undercuts and the gripping of elastic dentin. The depression in the base of the cavity in the gold filling prevents the teeth from changing position.

The advantages of such a bridge are:

A translucent central incisor instead of an opaque one.

Less destruction of the central incisor than by other methods of fixed bridge work.

Slight mobility instead of rigidity.

A lighter and less bulky bridge; also the contour of the central incisor is the same as nature provided.

Being smaller, is cleaner.

The central having the gold filling and rest in the distal surface has a normal mesial surface and contact point, which is better than those we make, especially when appearance and susceptibility to decay of the approximal tooth is considered.

Less danger of resulting death of the pulp as the cavity in the central incisor is never exposed to saliva and thermal irritation.

In case of the bridge becoming uncemented, one end being a rest, the bridge is easily cemented in place again.

# REVIEW OF CURRENT DENTAL LITERATURE

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[*Proceedings of the Royal Society of Medicine, Section on Odontology*, August 1919, xii, 9; pp. 104-18.]

## An Experimental Inquiry into the Bacteriology of Pyorrhea. BY J. G. TURNER AND AUBREY H. DREW.

The present work really forms a continuation of the work commenced by Drew and Griffin (*DENTAL COSMOS*, Oct. 1917).

The living pulp appears to become readily infected, such infection not necessarily being associated with caries in the ordinary acceptance of the term. (*Cf.* Beretta, *DENTAL COSMOS*, Jan. 1919.) The organisms found were diphtheroids, streptococci, spirochetes, and staphylococci. Mixed infections were always associated with caries to a greater or less extent.

Dentinal tubuli are frequently infected by way of the pulp cavity. The organisms most usually associated with these dentinal infections are diphtheroids, cocci, and spirochetes.

Cementum frequently becomes infected by one or more of three routes: (1) via pulp cavity and tubuli; (2) through periodontal membrane, and (3) from surface caries.

One of the author's preparations showed evidence that cementum can be infected from a living, but infected, periodontal membrane.

Portions of gum removed from chronic cases invariably showed bacteria; most frequently diphtheroids, streptococci, and staphylococci. In one instance, a heavy infection with a sporogenic bacillus was found. A diphtheroid was cultivated, apparently identical with *Bacillus septus* (*B. coryzae contagiosæ*); also a streptococcus was isolated, apparently identical with *S. pyogenes* (Gordon). The patient's serum gave marked complement fixation in the case of the diphtheroid. (*Streptococcus complement fixation not done at time of this report.*)

In the case in which the sporogenic organ-

ism was found, the gum showed a chronic fibrous thickening. There was no pocketing by destruction of the alveolar dental membrane, but only a swelling of the gum. No break in the continuity of the overlying epithelium was found. Apparently the bacteria gained entrance through a merely inflamed surface.

An exceedingly interesting point in the majority of these gingival infections is the entire absence of phagocytosis.

Sections of granulomata from the apices of teeth have invariably shown the presence of organisms. There appears to be little or no phagocytic reaction to the bacteria. The author's illustrations show staphylococci and diphtheroids in these tissues.

Sections through the jaws with teeth *in situ* in cases of advanced pyorrhea have shown the presence of organisms often in very large numbers in the bone, a striking fact being the presence of bacteria within the Haversian systems. In several cases of this nature the same organisms found in the bone (diphtheroids and cocci) have been found in the stomach wall.

[*Paris Medicale*, September 13, 1919.]

## The Tongue in Stupor. BY CHAVIGNY.

Chavigny calls attention to the stuporous tongue, so familiar to psychiatrists, as an indication of something radically wrong in the psychic sphere. This is done so that the general practitioner may recognize its significance, and certainly the general practitioner has no more opportunity to examine the tongue than does the dentist.

The condition of this organ to which Chavigny refers is a peculiar deformation of its thin antero-lateral borders, which for long periods in those afflicted with depressive mental states are pressed against the lingual (palatal) surfaces of the teeth and become conformed thereto. This sign (dental impres-

sions on the tongue or the stuporous tongue) is often encountered in grave general diseases (e.g., typhoid fever), but is always the consequence of muscular inertia, a symptom of immobility; and when seen by the dentist should result in referring the patient to the medical practitioner or the specialist in nervous and mental diseases.

[*Centralblatt für Bakteriologie, Parasitenkunde, und Infektionskrankheiten*. Originale, 1915. Bd. 76, S. 469-75.]

### Studies on the Anaerobic Bacteria of the Mouth: III. By Y. OZAKI.

The material is inoculated into pipets, containing half-solidified, though relatively transparent, horse-serum, previously treated to 60° C. Care must be taken that at least some of the material remains at the bottom of the medium which, when incubated at 37° C. for twenty-four hours, becomes clouded around the particles of the inoculating material. From these areas re-inoculations are continued until microscopic examination reveals spirochetal forms. Then stab-inoculations are made into half-solidified horse-serum. The tubes are hermetically sealed and kept seven to ten days at 37° C. In five to seven days in some of the tubes there became observable circular, delicately cloudy colonies, about 1-2 mm. in diameter. These are somewhat difficult to see. Transfers are made from these areas, which subinoculations are almost always pure cultures of a spirochete.

The micro-organisms will grow on ascites-agar or ascites-bouillon, but not on ordinary agar or glucose-agar. In pure culture the spirochete exhibited a certain polymorphism. In horse-serum, they are mostly very irregular spirals (usually 3-4 curves, occasionally 8 or more) 4-8 micra long, although the length varies from 2 micra to 20 micra. Stained by Giemsa, they appear to be 0.33 to 0.5 micra in diameter.

In ascites-agar the micro-organisms are usually somewhat smaller than in horse-serum and often fail to exhibit the spiral form. The ends are slightly pointed or somewhat rounded.

Stains poorly with ordinary dyes but fairly well with Giemsa. When strongly stained by Giemsa, the color is blue-violet; in later generations and also in weakly stained prepara-

tions, pale reddish to blue-red. The thicker elements are often better stained than the thinner. In older generations the difficulty of staining rapidly increases. True motility not demonstrable by dark-field illumination.

The organism is a strict anaerobe; does not grow at the lower temperatures; does not form gas (from what fermentable nutrient, it is not mentioned), indol or hydrogen sulfid. No unpleasant odor is noticeable in young cultures. After two to three weeks a very faintly disagreeable odor is discernible.

The micro-organism in its fourth generation was inoculated subcutaneously and intraperitoneally into rabbits, guinea-pigs, and mice. It was almost non-pathogenic. Subcutaneous injection of a large quantity of inoculating material in rabbits and guinea-pigs was only able to call forth locally a slight and transient induration.

[*Medical Record*, New York City, November 8, 1919, vol. xevi, p. 762.]

### Symptoms Associated with Dentition. By ELLSWORTH MOODY.

The two following cases are not offered as proof of the contention that they are the result of teething in any sense of the word, but it is felt that the coincidence is very striking.

CASE I. Male, age ten months; brought to office because of cough. Physical examination absolutely negative except for swollen gums over the maxillary and mandibular second incisors. History of cough preceding eruption of the first incisors, which cleared up after their eruption. Blood count normal: urine negative; temperature 98.8° F. by rectum. No medication was suggested, and after two days of careful physical examination and finding no other pathological reason for the cough the gums over the maxillary second incisors were scraped with a scalpel, allowing the teeth to come through. The cough disappeared immediately, to recur at the end of four days, when the mandibular second incisors were scraped through. The cough again stopped almost immediately.

CASE II. Female, age nine months. Seen because of convulsions. Rectal temperature 103°. General physical examination negative; reflexes normal; blood, spinal fluid, and urine negative. Bulging of gums over non-erupted maxillary first incisors. A second



convulsion came on during the examination. No treatment other than lancing gums. Within four hours the temperature had dropped; the child was apparently normal, and there were no more convulsions.

Moody has recently observed four cases whose history corresponds pretty closely to that of Case I. All cleared up within twenty-four hours after eruption of the teeth. In one case, elixir of terpin hydrate with heroin was given to an eleven-months-old babe, but did not affect the cough. Lancing the gums apparently cured her.

[*British Dental Journal*, London, September 1, 1919.]

### **A Substitute for Lost Osseous Tissue in Pyorrhea Treatment.** BY J. T. HALL.

Hall believes that the only way to get rid of pyorrhetic pockets, especially the interdental areas, seems to be by the use of a suitable filling material. The material for such a filling must be tasteless, non-irritating to the gingival tissues, and easily removable in case of necessity. Such a substance is sterilized hard paraffin, of a melting point not lower than 120° F. It lasts for considerable time provided that the contact surfaces on the adjacent teeth are normal so that there is no direct pressure of hard food on the filled pocket.

To insure success the pocket must be rendered aseptic. For this Hall prefers the strong official tincture of iodine (10 per cent.), if the pocket walls are entirely osseous. If either wall be gingival, the 5 per cent. tincture will be better tolerated. The pocket is swabbed therewith daily for several days.

To exclude food debris in the intervals of dressing, Hall uses a pledget of cotton steeped in antiseptic resin. Afterwards tough gutta-percha (so as to be removed in one piece) is used.

Having secured asepsis, the pocket is swabbed with absolute alcohol and carefully dried. For the paraffin filling, Hall uses an all-metal Imperial syringe fitted with a long flexible metal nozzle (supplied by Parke, Davis & Co.). The paraffin is melted in a water-bath, the syringe dried, warmed, and filled with melted paraffin, the nozzle introduced, and the pocket filled. Spray with cold water to harden and drill away the

paraffin to proper contour, allowing for a certain shrinkage on cooling.

If several pockets are to be filled, the syringe can be kept at the requisite temperature on a hot metal plate, or a piece of rubber tubing slipped over the barrel, or this may be wrapped with several thicknesses of rubber dam. The right temperature for working can be learned only by experience.

If desired, antiseptics may be combined with the paraffin, although Hall has not done so. This is in full consonance with the present trend in pyorrhetic treatment, although it would be interesting to try this method with one of the newer antiseptics, exhibiting minimum irritation to the tissues, *e.g.* dichloramin-T.

It might be pertinent to inquire of Hall whether this mechanical obliteration of the pockets does not delay or prevent their physiological obliteration by the reparative resources of the body; and if physiological obliteration be impossible, whether it be not advisable for the sake of oral hygiene to sacrifice the teeth.

[*Journal of Morphology*, Philadelphia, September 20, 1919.]

### **The Facial Musculature of the Japanese.** BY TOKUYASU KUDO.

The material for this study consisted of 5 Europeans (male), 3 Chinese (male), and 15 Japanese (10 male and 5 female). All were adults. A very detailed investigation was carried out, which is summarized as follows:

1. The platysma which takes part in the structure of the cheek region consists, for the most part, in the Mongolian of a continuous muscle plate, the same as in Europeans. Well-developed platysma fibers which extend in a line drawn from the corner of the mouth to the external auditory meatus or course above it have been found in 5 Japanese and 2 Chinese.

Most of the cases of the aberrant platysma strands, which rise orbito-temporalward and may often reach the zygomaticus or orbicularis oculi, have been observed in the Japanese, 11 out of 15 half-faces, and constantly in the Chinese. Kudo has nothing special to contribute with respect to the frequency of the neck portion in the Mongolians.

The M. mandibulo-marginalis has been

found twice in 15 half-faces of the Japanese. It is rarer in Europeans.

2. The muscles of Mongolians (Japanese and Chinese) which function as dilators of the mouth appear to be less divided than in Europeans. In the Mongolians the muscles are generally difficult to distinguish from one another, are more extensive and coarser. In the Mongolians the triangularis fibers for the most part are spread out, fan-shaped, along the margin of the jaw.

The *M. risorius* is generally present in Mongolians (twice in 15 Japanese half-faces, never in Chinese, 43 per cent. in negroes, 33 per cent. in 17 Hottentots). The *M. transversus menti* also occurs frequently, without exception in 15 Japanese and 3 Chinese, 60 per cent. in Europeans, 30 per cent. in the negroes. In Mongolians, as a rule, the three parts of the *quadratus labii superior* fuse into a single plate; further the *caput zygomaticus*, constantly present in Mongolians, is distinguishable with difficulty from the neighboring muscles.

3. The musculature around the eye is more strongly developed in Mongolians, especially in Chinese, than in Europeans. The bundles radiating at the lower median part are especially strongly developed. The separation of the muscle from its surroundings is usually not definite (connection with *M. zygomaticus* and *M. quadratus labii superioris*).

4. The *epicranius* shows no noteworthy difference between Japanese and Europeans. The junction of the muscle of either side along the median line in the region of the middle third of the muscle follows the same plan as that in the European, and also in the negro.

5. Likewise Kudo found no special difference in the muscles around the external ear in his material. Nevertheless, he thinks that examination of more extensive material might eventually reveal a racial difference.

The *M. transversus muchæ* is more frequent in the Japanese, negro 58 per cent., Japanese in half of 15 half-faces, Europeans 37 per cent. The *M. auriculo-frontalis* was found 6 times in the Japanese and once in the Chinese, 3 half-faces.

(6) In spite of a considerable difference in form of the nose, nothing noteworthy has been found with respect to its muscles.

(7) The facial musculature as a whole in

the Mongolians appears to show only individual minor differences.

Thus, in general, the facial musculature of the Japanese presents a more primitive, undifferentiated type than that of the European. It is to be noted, however, that in certain parts, e.g. the peri-ocular musculature, the reverse obtains.

[*Proceedings of the Royal Society of Medicine, Section on Laryngology*, August 1919, xii. pp. 9; 256.]

#### **Buccal or Sucking Pads.** BY WYATT WINGROVE.

Coronal sections (frozen) through heads of infants from birth to six months old showed a spherical circumscribed mass of true adipose tissue in each cheek, surrounded by well-defined fibrous capsules from which it can be easily "shelled" out. In one emaciated infant (two weeks old) the pad could not be found. Although imperceptible in some cases of primary emaciation, the "pads" do not appreciably share in the general disappearance of body fat. Their absence is held responsible for the difficulty in sucking and for "false adenoidism" in infants. No reference is made to the existence of these structures in standard works on anatomy.

[*Presse Médicale*, Paris, No. 41, July 24, 1919, p. 407.]

#### **Noma Following Influenza.** BY GEORGES PORTMANN.

The condition is very rare.

CASE. The patient was a man, age forty-three years. Past history negative, particularly in regard to syphilis, malaria, tuberculosis. Entered hospital on October 30, 1918, for influenzal broncho-pneumonia. (The influenza was mild and the broncho-pneumonia not serious.) On November 13th, when about to leave hospital, he complained of a slight pain upon the internal surface of the right buccal commissure.

At the center of an area of edematous mucosa was a small black crust, hard to the touch, surrounded by a narrow inflammatory zone. Nothing apparent on the skin surface opposite the mucous lesion. Three days later all the local and general symptoms of noma were unmistakably present. The condition became progressively worse. Eventually under regional and local anesthesia the affected



tissues (and extending beyond them for 1 cm. into healthy tissue) were excised with thermo-cautery; deep ignipunctures and antiseptic pulverizations every hour with mercuric chlorid (1:5000). The pulverizations were continued. At the end of November, the patient left the hospital completely cured.

The views of Portmann upon the pathogenesis and therapy of noma are very rational. The primary lesion is a gangrene of a greater or lesser area of the oral mucosa. The gangrene is sequent to the embolism, arteritis or arterial thrombosis so frequently resulting from infection.

The gangrenous area, or at least an area whose nutrition is seriously diminished, is secondarily infected by any of the innumerable pathogenic micro-organisms of the oral cavity. Based on this concept, the treatment has two principles: (1) to remove by thermo-cautery freely and extensively all tissue which might become infected, extending the borders of this susceptible (gangrenous or becoming gangrenous) area at least 1 cm. into healthy tissue. The earlier this surgical intervention is accomplished, the better; (2) to protect the operatory wound from infection by creating a barrier impossible to oral micro-organisms. This is done by frequently renewed applications of powdered antiseptics.

[*Proceedings of the Royal Society of Medicine, Section on Diseases of Children, August 1919, xii, pp. 9, 78.*]

#### **Lymphangioma of Tongue.** BY B. HOWELL.

Boy of six years. No family or personal history throws light on present condition. Wassermann negative. A congenital nevus of lower lip, involving also gingival mucosa. Swelling of tongue first noticed when child was three years old; commenced on posterior aspect and has grown slowly forward. Now stationary. Vesicles continually break down and ulcerate, giving rise to pain. Occasionally tongue enlarges without apparent cause and protrudes from mouth. It is then excessively painful. Salivation excessive, articulation (speech) impaired. Tonsils much hypertrophied. Submaxillary and lymphatic glands much enlarged. Submental glands palpable.

Since making above report, the child has been taken for treatment to the Radium Institute.

[*Journal of Heredity, Washington, D. C., October 1919.*]

#### **A Defect of Hair and Teeth in Cattle—Probably Hereditary.** BY LEON J. COLE.

A pure-bred Holstein-Friesian sire with defective front teeth, bred to pure-bred Holstein-Friesian cows, produced in two successive years five calves with deficient coats, three of which are known to have had defective dentition corresponding to the condition of the sire. In the same season the same bull sired some fifteen or twenty normal calves from dams of the same herd. The bull, instead of the normal complement of four well-formed mandibular incisors on each side, had only three small, imperfect teeth on the left and two small teeth on the right. The dams of the calves, so far as known, all had normal dental formula. Of the three defective calves, one had two small teeth on the left and one on the right, the second had one very small tooth on the left and one small one on the right, while the third had two conical teeth on each side, the distal ones being very small, while those in front were larger but round and blunt.

Associated with this deficiency of teeth there was also a deficiency of hair. This was quite noticeable in the very young calves, especially on the head and neck. The hair was not entirely lacking on these parts, but was very short, giving a semi-denuded appearance. Later in life the coat appears to be practically normal.

This association of defects, of excess or of deficiency, of the ectodermal organs (hair, teeth, nails) has long been known to occur in man, and to be in some instances at least inheritable.

[*Proceedings of the Royal Society of Medicine, Section on Laryngology, August 1919, xii, pp. 9, 255.*]

#### **A Series of Cases of Maxillary Antral Disease.** BY W. S. SYME.

The communication is based on 878 cases of antral disease, observed since January 1914. Of these, both antral cavities were affected in 599, the right alone in 143, and the left alone in 136.

Operations were performed on 293 double, 56 right, and 47 left, and except for three cases in which the intranasal procedure was



adopted, the radical antral operation was performed. Local anesthesia was used in 306, and general anesthesia in 90 cases. In 26 cases choanal polypus was present, and in 2

of these there was a choanal polypus on both sides. Ordinary nasal polypi were present in 89 cases, and atrophic rhinitis in 27; 31 patients complained of asthma.

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## OBITUARY

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### Dr. B. Holly Smith.

[SEE FRONTISPIECE.]

DIED, of angina pectoris, at his home in Baltimore, Md., January 22, 1920, in the sixty-second year of his age, B. HOLLY SMITH, D.D.S., M.D.

Dr. Smith, president of the Baltimore College of Dental Surgery, was born in Prince George's County, Md., March 17, 1858, and was the son of the Rev. Bennett H. and Mattie C. Smith. He received his early education at Loudon Valley Academy, Virginia, and in the public schools of Baltimore. In 1881 he graduated from the College of Dental Surgery and in 1883 from the College of Physicians and Surgeons in Baltimore.

At different times Dr. Smith was president of the National Dental Association, the Southern Dental Association, the Maryland State Dental Association, the National Association of Dental Faculties, the Oral Hygiene Council of Maryland, and was a Fellow of the American Academy of Dental Science. He was also a member of the Fédération Dentaire Internationale and of the Delta Sigma Delta Fraternity.

The establishment and present perfection of the system of oral hygiene in vogue in the public schools of Baltimore was due largely to the efforts of Dr. Smith, and one of his greatest interests was the establishing of a dental clinic in the schools. He made a thorough study of the dental conditions and diseases prevalent among children and added much to the means of combating such diseases in their earliest stages.

Dr. Smith practiced dentistry for thirty-seven years and was known throughout the dental profession and a large *clientèle* as a skilful and intelligent practitioner of den-

tistry. His influence and leadership in all activities relating to his profession were profound and far-reaching. His forceful personality, his aggressive spirit, his rightmindedness, were always enlisted in every effort toward professional progress in dentistry. His keen sense of personal honor was practically reflected in the standards by which his professional life was gaged, and in the ethical practice which he taught and exacted of others. While an unrelenting antagonist of all that was narrow, mean or unworthy, he was the loyal champion and friend of all who strove to meet his standards of professional life and ideals. His love of animals and flowers, indeed, his intense love for all living things, and his natural poetic instinct gave him a deeper insight into the heart of nature, which shaped and defined both his philosophy of life and his conception of religion. It was these elements of his character that in all of his life relations exemplified in an individual way the practical truth of Coleridge's lines:

"He prayeth best who loveth best  
All things both great and small,  
For the dear God who loveth us  
He made and loveth all."

He was a good lover in its finer and broader sense. His love of nature made him her sympathetic student and interpreter, and to nature as well as to all he loved he was loyal and true. His natural gift of oratory was but the expression of his own fineness of character and sentiment. He swayed his audiences by his heart qualities and his love of truth in faultless diction that was chaste in style, poetic in quality, and convincing in character.

The passing of B. Holly Smith removes a commanding figure from the active working

forces that are making for a higher conception of the possibilities of dentistry, and his loss creates a void that cannot easily be filled. To his host of friends his death comes as a personal grief, one more of those sorrows which, even though in the scheme of life they are inevitable, are none the less inscrutable.

Dr. Smith was married in 1883 to Miss Frances G. Hopkins, Baltimore, who, with four sons, B. Holly Smith, Jr., D.D.S., F. Noel and W. Conwell Smith, and F. Janney Smith, M.D., three brothers and one sister, survives him. His remains were interred in Loudon Park Cemetery, Baltimore, Md., January 24, 1920.

### Dr. Henry W. Morgan.

[SEE FRONTISPIECE.]

DIED, Saturday, January 17, 1920, at his home, Nashville, Tenn., after several weeks' illness, in his sixty-seventh year, HENRY WILLIAM MORGAN, M.D., D.D.S.

Dr. Morgan was born in Davidson County, Tenn., on October 25, 1853, the son of Dr. William Henry Morgan and Sarah (Noel) Morgan. He received his early education in the Nashville city schools and graduated from the high school in 1873. Soon after his graduation from the high school, he entered the Medical School of Vanderbilt University, being the first matriculant of that school and the first to receive a diploma from the Medical Department. Immediately following his graduation from the Medical School of Vanderbilt University, he entered the Philadelphia Dental College, from which institution he received the D.D.S. degree in 1877. Following his graduation from the Philadelphia Dental College he associated himself in the practice of dentistry with his distinguished father, Dr. William Henry Morgan, in Nashville, Tenn., which association continued until the death of his father. In 1886 Dr. Morgan was made Professor of Operative Dentistry in the Vanderbilt School of Dentistry and in 1911 became Dean of the school, which position he held until the spring of 1919 when the school was discontinued by the Vanderbilt Board of Trustees but later reorganized, when Dr. Morgan was made Dean Emeritus.

Dr. Morgan was actively prominent in dental society circles for many years and served in various capacities among the dental asso-

ciations of his state and of the nation. He was a member and ex-treasurer of the National Dental Association; a member and ex-president of the American Institute of Dental Teachers; a member and ex-president of the Nashville Dental Association; a member and ex-president of the Tennessee State Dental Association; a member and ex-president of the National Association of Dental Faculties; ex-president of the Vanderbilt Alumni Association, and a member of the Delta Sigma Delta dental fraternity, serving the latter in the capacity of Supreme Grand Master in 1918. He was also a member of the Board of Trustees of the Walden University of Nashville and of the Meharry Medical and Dental School, Nashville.

Dr. Morgan was also prominent in Masonic circles, being a Thirty-third Degree Mason; Past Grand Chancellor of the Knights of Pythias of Tennessee; Past Grand Regent and Past Supreme Representative of the Royal Arcanum. He was also a member of the Methodist Episcopal Church South, holding membership in the West End Methodist Church, Nashville, and always took a prominent and active part in the affairs of that denomination.

Dr. Morgan was widely known in the dental profession throughout the United States and Canada as an expert operative dentist, having filled the chair of Operative Dentistry in the Vanderbilt University Dental School for more than forty years. For many years he was treasurer of the National Dental Association and served that association as a member of many important committees on dental education, as well as being chairman of the *ad interim* Committee of the National Association of Dental Faculties. He contributed largely to dental literature through the various dental journals and his interest in the profession and the high standards he advocated gave to the Dental School of Vanderbilt University its standing as one of the leading dental schools of the country.

Dr. Morgan was a thorough Christian gentleman and his life and character made a deep impress for good on the profession of dentistry during what may be called its most impressionable developmental period. He was a man of strong convictions and fearless in the support of his convictions. He was at all times loyal to his friends and always took



a personal interest in the welfare of his students. It may be truthfully said of Dr. Morgan that he did as much or more for the establishment of dental education on a high moral and ethical plane than any one man in the South. The influence of his long life of teaching, both by precept and example, will be felt for years to come not only throughout the South, but throughout the entire dental world. In the death of Dr. Morgan the profession has lost one of its most distinguished and revered members, and his loss will be generally mourned by all who knew him personally as well as by reputation.

Of the many tributes paid to the life and character of Dr. Morgan, the one that seems the best measure of the man, is that by Corra Harris, the author of "The Circuit Rider's Wife," who from the beginning of her career as a writer, though a stranger in Nashville and not known personally by Dr. Morgan, was the recipient of many messages of appreciation and encouragement from him in her various literary efforts. Mrs. Harris visited Dr. Morgan a few weeks before his death, when she met him for the first time and at his death penned the following beautiful tribute:

"Two weeks ago the writer came to Nashville, and hearing that Dr. Morgan was ill she went one Sunday morning to call on him, and after so many years met for the first time the fine gentleman who had been her first friend in Tennessee to offer her encouragement. Then she understood the grace and generosity for which she was so deeply indebted to him. Already the vision of another world was in his eyes. Already his face was freshening with the keen premonition of immortality. There were wing tracks in the air. But his heart was still the heart of a man and filled with love and interest for the world in which he lived and achieved. He talked with strange confidence and assurance of this world's future when other men's minds are full of fears. There was, in his conversation, the fragrance of celestial thoughts, a sublime assurance and hope in the fate of mankind which only comes to men who believe in God.

"In the life of such a man death can only be an incident, and for those friends whom he earned with his kindness and service he still lives and abounds."

Dr. Morgan was married in November 1880

to Miss Matilda Alloway Evans of Nashville, who, with two sons, William Henry and Dr. Walter Morgan, and three daughters, survives him. His remains were interred in the Mt. Olivet Cemetery, Nashville, Monday, January 19, 1920.

### Mr. William A. Johnston.

DIED suddenly, Wednesday, January 14, 1920, in his sixty-ninth year, Mr. WILLIAM ARMOUR JOHNSTON, Prince Bay, Staten Island, N. Y.

Mr. Johnston was born April 3, 1851, at Middletown, Conn., the son of Dr. John Johnston, Professor of Natural Philosophy and acting president of Wesleyan University, and was graduated with the degree of Bachelor of Science from Wesleyan in the class of 1870. Immediately after his graduation he joined his three older brothers in the firm of Johnston Brothers, manufacturers of dental supplies, for the specific purpose of promoting and improving the methods of manufacturing nitrous oxid, one of the products of the concern. In 1881, upon the consolidation of the business of the late S. S. White and Messrs. Johnston Bros., Mr. Johnston assumed charge of the manufacturing plant located at Staten Island, where most of the company's products were made. Later he became resident director and member of the Board of Directors of the S. S. White Dental Manufacturing Company.

Mr. Johnston's experience in the manufacture of dental supplies extended over a period of fifty years, in the course of which he acquired an intimate knowledge of dental requirements and the development of dental apparatus. His efforts were devoted unceasingly to the production of the highest quality of dental products with an uncompromising protest against commercial pressure for cheapness rather than excellence. He was actively engaged in the company's interest when his sudden death occurred in New York City.

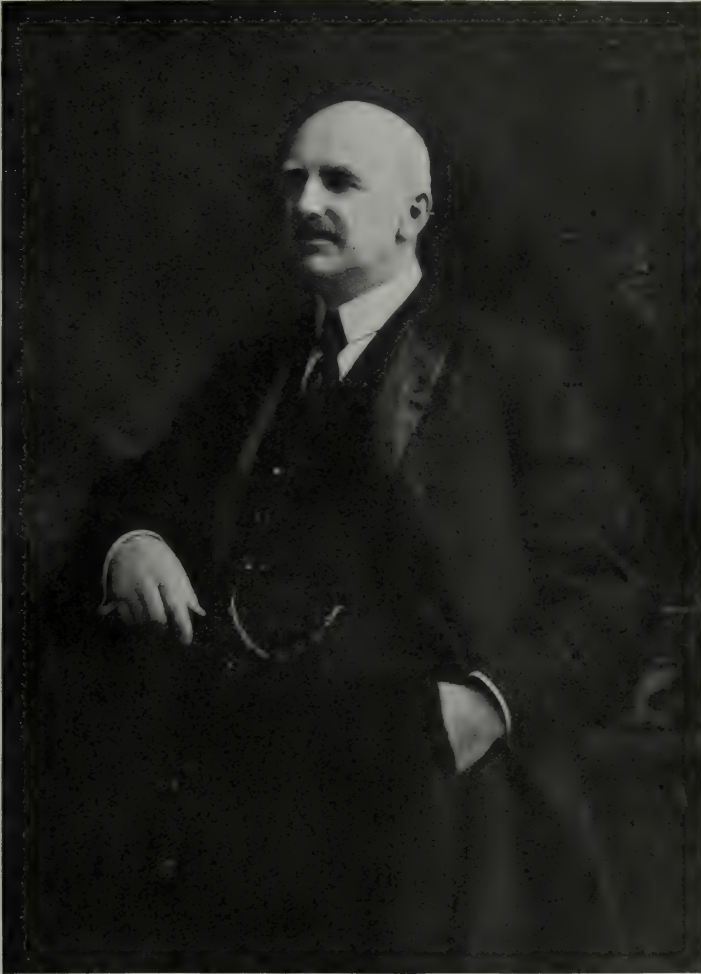
Born and reared in a college atmosphere, Mr. Johnston's interest in scientific matters led him to active membership in many scientific societies, among which were the American Association for the Advancement of Science, the American Electro-Chemical Society, the Society of Chemical Industry, the Rubber Association of America, and the Compressed Gas Manufacturers Association.

Mr. Johnston took a warm personal interest



in the welfare of those under his direction and in the community in which he lived. He was responsible for the organization of the

years and senior warden for fifteen years. The many friends who learned to know him well will always remember him for his strength



MR. WILLIAM A. JOHNSTON.

S. S. White Company's Benefit Association and was a trustee of the Staten Island Hospital, member and director of the Chamber of Commerce and the Staten Island Savings Bank. He was a vestryman of old St. Andrew's Church at Richmond for twenty-six

of character and lovable disposition and will feel keenly his loss.

Mr. Johnston is survived by his widow, Mrs. Minnie (Morris) Johnston, one daughter, Elise, and one son, William Armour Johnston, Jr.

### "In Memoriam."

#### Dr. Henry W. Morgan.

THE following memoriam on the death of Dr. HENRY W. MORGAN was adopted by the Society of Dental Surgeons of Nashville, Tenn.:

God, the all-powerful Ruler of the destinies of man, who works in a wondrous way His mysteries to perform, has but now taken from us and unto Himself our greatly beloved brother and friend, Dr. Henry William Morgan. A splendid Christian gentleman, loyal friend, true to his ideals of our profession, outspoken, fearless, yet an inspiration to all who knew him, he was a man among men, revered and loved.

He served the profession of dentistry for over forty years of his life well and intelligently. For many years he gave largely of his time and ability to the advancement of his profession, to the better opportunities and facilities for teaching students the advanced thoughts and sciences of the day.

As a professor and instructor in the School of Dentistry, of Vanderbilt University, he stood in the front rank of the highest class of educators. There is not a dentist or a dental organization anywhere that has not suffered an irreparable loss in his death.

He was a contemporary of Black, Kirk, McKellops, Bonwill, Noyes, Cushing, and Johnson. He ran an even race with these eminent men in high professional attainments.

We are confident that the spirit of his energies and love of fellowman still live and will rest among us for all time and will forever contribute to our better welfare professionally and individually.

May his soul rest in peace and may the memory of him and his deeds be graven deep in our hearts as well as on the tablets of the Hall of Fame erected in honor of the great men of our profession.

We, the Society of Dental Surgeons of Nashville, Tenn., do feel our loss in the taking away of our beloved member more deeply than we know how to express.

A great sympathy goes out to the family. We mourn with them his passing from us, but glory in the knowledge that he rests in the bosom of his God.

D. M. CATTELL,  
J. H. PHILLIPS,  
R. BOYD BOGLE, *Committee.*

### "In Memoriam" Resolutions.

#### Dr. B. Holly Smith.

At a meeting of the Board of Governors of the Maryland State Dental Association, held January 23, 1920, the following resolutions on the death of Dr. B. Holly Smith were adopted:

*Whereas*, we, the members of the Maryland State Dental Association, have heard with sincere sorrow of the sudden passing of our friend and fellow member, Dr. B. Holly Smith; and

*Whereas*, we desire to express our love for and manifest our appreciation of so valuable a representative of Dental Science; therefore be it

RESOLVED, That in the death of Dr. Smith, we have lost a most estimable friend and the profession, locally and nationally, an earnest, energetic and worthy advocate of the highest ideals in the advanced methods of alleviating human suffering from oral defects, and who, by his untiring efforts, has succeeded in establishing Free Dental Clinics in the Public Schools of Baltimore; and be it further

RESOLVED, That his pleasing presence, wise counsel, and matured advice will be sadly missed in the meetings of his state and national conventions to which he was most loyal and devoted, manifesting keen interest in every detail that would aid in the progress of his chosen profession, and wherein his wisdom and understanding of dental science made impressions that were signally felt; and be it further

RESOLVED, That the good fellowship and enduring friendship that his winsome presence made wherever he went will always remain a delightful memory to those fortunate enough to have come in contact with so vital and energizing a spirit; and be it further

RESOLVED, That we have spread on the records of this association these resolutions: that a copy be presented to his family and also to the various dental journals of the country and a copy be printed in the daily press of Baltimore.

W. W. DUNBRACCO,  
B. LUCIEN BRUN, *Committee.*

# SOCIETY NOTES AND ANNOUNCEMENTS

NOTICES should reach the Office of the DENTAL COSMOS *not later* than the 11th or 12th of the month preceding that of publication.

## American Society of Orthodontists.

THE next annual meeting of the American Society of Orthodontists will be held at the Edgewater Beach Hotel, Chicago, Ill., Monday, Tuesday, and Wednesday, April 5, 6, and 7, 1920. Those interested in orthodontia are invited to attend.

J. V. MERSHON, *President*,  
Philadelphia, Pa.  
F. M. CASTO, *Sec'y*,  
Cleveland, Ohio.

## American Institute of Dental Teachers.

At the annual meeting of the American Institute of Dental Teachers, held at Detroit in January 1920, the following officers were elected: Dr. Arthur D. Black, Chicago, president; Dr. Guy S. Millberry, San Francisco, vice-president; Dr. Abram Hoffman, Buffalo, secretary-treasurer. Executive Board—Dr. A. H. Hipple, Omaha, Dr. A. E. Webster, Toronto, Ont., Dr. E. D. Coolidge, Chicago.

ABRAM HOFFMAN, *Sec'y*,  
381 Linwood Ave., Buffalo, N. Y.

## Canadian Dental Association.

THE Canadian Dental Association will hold its Tenth biennial meeting in Ottawa, Can., August 17, 18, 19, and 20, 1920.

SYDNEY W. BRADLEY, *Sec'y*,  
206 Laurier ave., W., Ottawa, Ont.

## Sigma Epsilon Delta Fraternity.

THE next regular meeting of the Grand Council of the Sigma Epsilon Delta will be held at the Hotel Astor, 44th st. and Broadway, New York City, on Tuesday, March 23d, at 8.30 P.M. Full representation from all chapters is requested.

By order of the Grand Council.

ROBERT E. ELSTER, *Master*.

## National Dental Association.

THE twenty-fourth annual meeting of the National Dental Association will be held in Mechanics Building, Boston, Mass., August 23 to 27, 1920.

The Mechanics Building is one of the largest in the United States for exhibition purposes of every description. It is over six hundred feet in length and covers over three acres of land, containing over 150,000 square feet of floor space, and is known all over the continent as the home of the far-famed poultry, automobile, and dog shows, mechanics' and food fairs. World-renowned opera singers have entertained thousands of music lovers in the Grand Hall. Presidents and noted speakers have addressed thousands of citizens of Massachusetts in this vast hall.

The association is indeed fortunate to secure such a building for its meeting, as it assures ample room for clinics, demonstrations, and exhibits under one roof, with facilities for taking care of ten thousand members of the profession and guests.

F. E. JEFFREY, *Chmn. Pub. Committee*,  
Salem, Mass.

## Texas State Dental Society.

THE Texas State Dental Society will hold its fortieth annual convention March 8 to 13, 1920, at Dallas, Tex.

The special feature of this meeting will be postgraduate class courses conducted on the "Oklahoma plan."

These classes will be conducted by the following well-known men: Dr. Thomas B. Hartzell, Minneapolis, Minn.; Dr. F. Ewing Roach, Chicago, Ill.; Dr. Arthur E. Smith, Chicago, Ill.; Dr. Dayton D. Campbell, Kansas City, Mo.; Dr. T. W. Maves, Minneapolis, Minn. Other instructors may be employed.

J. G. FIFE, *Sec'y*,  
736 Wilson Bldg., Dallas, Tex.



### Vermont State Dental Society.

THE Vermont State Dental Society will hold its next annual meeting in Burlington on Wednesday, Thursday and Friday, March 17 to 19, 1920.

PHILIP E. MELLEN, *Sec'y*,  
Middlebury, Vt.

### Minnesota State Dental Association.

THE thirty-seventh annual convention of the Minnesota State Dental Association will be held at the West Hotel, Minneapolis, Minn., on March 4, 5, and 6, 1920.

MAX E. ERNST, *Sec'y*,  
1125 Lowry Bldg., St. Paul, Minn.

### Illinois State Dental Society.

THE fifty-sixth annual meeting of the Illinois State Dental Society will be held in the Congress Hotel, Chicago, March 22, 23, 24, and 25, 1920.

The following essayists have been secured: Dr. Alfred C. Fones, Bridgeport, Conn.; Dr. Norman S. Essig, Philadelphia, Pa.; Dr. Wm. H. G. Logan, Chicago; Dr. Newton G. Thomas, Chicago; Dr. Hart J. Goslee, Chicago; Dr. F. E. Roach, Chicago; Dr. K. W. Knapp, Des Moines, Ia.; Dr. A. A. Herdliska, U. S. Public Health Service, Washington, D. C.

A most cordial invitation is extended to all ethical practitioners in Illinois and neighboring states.

G. WALTER DITTMAR, *President*,  
J. P. LUTHRINGER, *Sec'y*.

### Oklahoma State Dental Society.

THE next meeting of the Oklahoma State Dental Society will be held in Tulsa, Okla., March 15 to 20, 1920. This meeting will be conducted on the class system of postgraduate instruction.

The attendance will be divided into classes, by enrolment previous to the time of the meeting, and each class will take up the intensive study of one subject for the full week.

At this time the following teachers have been engaged: Dr. Thos. B. Hartzell, Pyorrhea and Prophylaxis; Dr. Arthur E. Smith, Nerve Blocking and Anesthesia; Dr. Dayton D. Campbell, Full Dentures; Dr. F. E. Roach, Partial Removable Dentures; Dr. T. W. Maves, Inlays and Abutments for Vital Teeth.

These teachers will have assistants to help

with the class work. The instruction will consist of lectures, technical and practical demonstrations. Ample facilities will be provided for clinical instruction and where possible the students of each class will be expected to do much of the practical work.

This meeting is one of a chain of meetings to be conducted by the Texas, Kansas, South Dakota, and Oklahoma State Dental Societies. Any dentist in good standing in his state society with 1920 dues paid desiring to do so will be permitted to attend the Oklahoma meeting provided the class of his choice is not filled by our own members.

The class fee is fifty dollars. The *Bulletin* of the Oklahoma State Dental Society, which gives full information about our meeting, will be mailed to any person upon request.

C. R. LAWRENCE, *Gen'l Manager*,  
Stephenson Bldg., Enid, Okla.

### South Dakota State Dental Society.

THE thirty-eighth annual meeting of the South Dakota State Dental Society will be held in Sioux Falls, S. D., March 29 to April 3, 1920. One week of postgraduate instruction will be given under the following clinicians: Drs. Arthur E. Smith, Chicago, Ill.; F. Ewing Roach, Chicago, Ill.; Dayton D. Campbell, Kansas City, Mo., and T. W. Maves, Minneapolis, Minn.

ERNEST W. ELMEN, *Sec'y*,  
608 S. E. Nat'l B'k Bldg., Sioux Falls, S. D.

### Missouri State Dental Association.

THE annual meeting of the Missouri State Dental Association will be held at the Baltimore Hotel, Kansas City, Mo., April 12, 13, and 14, 1920.

H. C. POLLOCK, *Sec'y*,  
St. Louis, Mo.

### Dewey School of Orthodontia.

ALUMNI SOCIETY.

THE next annual meeting of this society will be held on April 1, 2, and 3, 1920, at the Edgewater Beach Hotel in Chicago. The usual high standard of the meetings of this society will be maintained. One half-day will be devoted to clinics. All interested in orthodontia are cordially invited to attend these meetings.

GEORGE F. BURKE, *Sec'y*,  
741-43 David Whitney Bldg., Detroit, Mich.

### Alabama Dental Association.

THE next regular meeting of the Alabama Dental Association meets at Mobile, Ala., April 13, 14, and 15, 1920.

S. B. HOPKINS, *Sec'y*,  
Greenville, Ala.

### Michigan State Dental Society.

THE next annual meeting of the Michigan State Dental Society will be held at the Hotel Statler, Detroit, Mich., April 12, 13, and 14, 1920.

The chairman on local arrangements is William H. Waller, 613 Washington Arcade, Detroit, Mich., and the secretary, Claude S. Larned, 614 Post Building, Battle Creek, Mich.

CLAUDE S. LARNED, *Sec'y*,  
Battle Creek, Mich.

### Pennsylvania State Dental Society.

THE fifty-second annual meeting of the Pennsylvania State Dental Society will be held in the Rajah Theatre, Reading, Pa., April 27, 28 and 29, 1920. An interesting and instructive program has been prepared. All ethical practitioners are invited to be present.

W. L. FICKES, *Sec'y*,  
6004 Penn ave., Pittsburgh, Pa.

### Dental Department of the University of Buffalo.

#### ALUMNI ASSOCIATION.

THE Alumni Association of the Dental Department of the University of Buffalo will hold its annual meeting at the Hotel Iroquois, on April 15, 16, and 17, 1920.

The meeting will be a part of an alumni postgraduate week. The week of April 12th will afford an opportunity for every dentist who chooses to take postgraduate work from the following men:

Rupert E. Hall, D.D.S., Chicago, Ill. "Full Prosthesis."

W. Earnest Cummer, D.D.S., Toronto, Ont. "Attached Plates and Removable Bridge Work."

Clifford E. Rose, D.D.S., Buffalo, N. Y. "Conduction Anesthesia."

Leuman M. Waugh, D.D.S., New York City. "Radiology."

This elaborate offering for your approval is an entire departure from plans of other years, and will, if you choose to make it so, be the most beneficial thing the association has ever done for the dental profession.

The regular alumni meeting, which will occur the last three days of the week, will be addressed by the men who give the course, and, together with a large general clinic and an unusually attractive exhibit, will make a program which we are proud to present to you.

The postgraduate classes will be limited to thirty men in each subject, and will be so arranged that any two subjects, excepting "Full Prosthesis," can be taken in the week. Further information regarding this feature of the meeting can be obtained from Dr. J. G. Roberts, 174 E. Ferry st., or Dr. W. W. Cavers, 450 Elmwood ave., Buffalo.

Your officers and committees are exerting every effort to give you a profitable week for study and pleasant association. We anxiously seek your approval.

JAMES L. CLEMENTS, *President*,  
CLIFFORD E. ROSE, *Secretary*,  
GUY M. FIERO, *Chair. Business Com.*

### Kentucky State Dental Association.

THE next annual meeting of the Kentucky State Dental Association will be held in Louisville, Ky., April 7, 8, and 9, 1920.

A program of unusual interest has been planned. Address all correspondence to

W. M. RANDALL, *Sec'y*.  
1035 Second st., Louisville, Ky.

### Philadelphia Dental College.

#### ALUMNI SOCIETY.

THE annual meeting of the Alumni Society of the Philadelphia Dental College (Temple University) will be held on Wednesday, April 21, 1920, at 9 A.M., in the college building at Eighteenth and Buttonwood sts., Philadelphia. All members should note the date and arrange to be present. If you are not a member you are welcome to come and enjoy the P. D. C. brand of clinics and papers. We have secured as essayist, Dr. Harvey J. Burkhart, Director of the Rochester Dental Dispensary, and past-president of the National Dental Association.

His subject is Oral Hygiene, a very important subject just at this time to all dentists.

FRANKLIN S. FLUCK, *Pub. Com.*,  
2440 N. Seventh st., Philadelphia, Pa.

Dr. L. S. Blatner, 346 State st., Albany, N. Y., is chairman of the Exhibits Committee.

A. P. BURKHART, *Sec'y*,  
52 Genesee st., Auburn, N. Y.

### Dental Society of the State of New York.

THE fifty-second annual meeting of the Dental Society of the State of New York will be held in Albany, May 13, 14, and 15, 1920, at the Hotel Ten Eyck. An interesting program of essays and clinics is being prepared and will be announced later. All ethical dentists residing in New York and adjoining states are cordially invited to attend the meeting.

### Massachusetts Board of Examiners.

THE next meeting of the Massachusetts Board of Dental Examiners will be held in Boston, Mass., March 10, 11, 12, and 13, 1920, beginning promptly at 9 A.M., March 10th.

All applications must be in the hands of the secretary by March 1st. Fee for examination, \$20. Full information and application blanks may be received by addressing

J. N. CARRIERE, *Sec'y*,  
352 Main st., Fitchburg, Mass.

## UNITED STATES PATENTS PERTAINING OR APPLICABLE TO DENTISTRY

ISSUED DURING JANUARY 1920.

#### *January 6.*

- No. 1,326,900, to ULFERT L. ALBERS. Toothbrush.
- No. 1,327,114, to MEYER L. RHEIN. Gage for dental and surgical instruments.
- No. 1,327,149, to LELLOYD O. DUNCAN. Reservoir broach.
- No. 1,327,306, to ISIDORE S. BERGER. Toothshade guide.
- No. 1,327,477, to JAMES W. IVORY. Dental hand porte-polisher.

#### *January 13.*

- No. 1,327,674, to CHARLOTTE HINCHEY. Denture.
- No. 1,327,757, to WILLIAM J. EGGERS. Rubber toothbrush.
- No. 1,327,807, to PAUL B. BURLEIGH. Toothbrush.
- No. 1,328,007, to HOMER MANNON, HERMAN

BROWN, and ROBERT G. PERKINS. Indicating device.

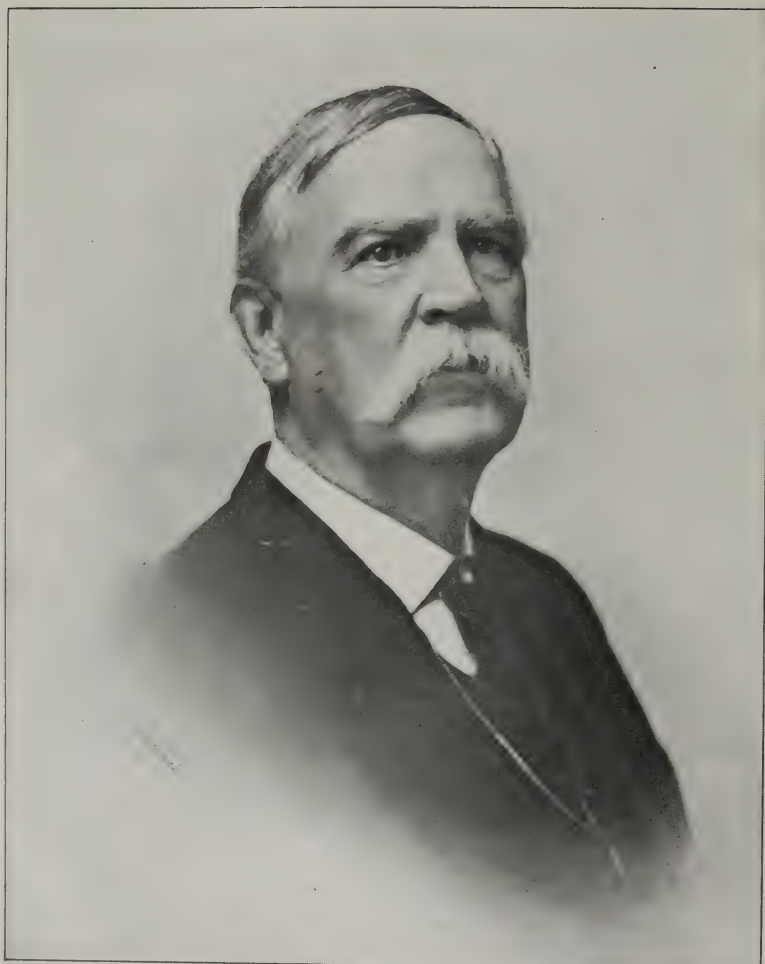
- No. 1,328,095, to ALFRED P. MERRILL. Rotary shaft and coupling for electric dental engines.
- No. 1,328,131, to FRANK BROUGHTON DAVIS. Dental instruments.
- No. 128,614, to LEOPOLD BAHR. Trade-mark for antiseptic fluid for cleansing and whitening the teeth.
- No. 128,654, to CHARLES S. COHEN. Trade-mark for preparation for the amelioration of pyorrhea alveolaris, gingivitis, and bleeding or receding gums.

#### *January 20.*

- No. 1,328,351, to GEORGE H. WHITELEY, JR. Mold for molding artificial teeth.
- No. 128,979, to GARDNER BROTHERS. Dental casting machines and parts of the same.







DR. JAMES McMANUS.

# THE DENTAL COSMOS

VOL. LXII.

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No. 4

## ORIGINAL COMMUNICATIONS

### A Contribution to the Pathology and Treatment of Hypersensitive Dentin.

By HERMANN PRINZ, D.D.S., M.D., Philadelphia, Pa.

*From the Pharmacological Laboratory, Thomas W. Evans Museum and Dental  
Institute, University of Pennsylvania.*

**H**YPERSENSITIVE dentin may be defined as a *state* in which the exposed dentin of a vital tooth is painfully responsive to mechanical, chemical, thermal, or electric irritation. The primary cause must be always attributed to its exposure to an irritant. Absence of enamel or otherwise pathologically denuded dentin is the necessary initial condition essential for its causation. Enamel, which protects the dentin of the crown, may be absent as a sequence of incomplete calcification or it may be lost through pathological processes, such as caries, erosion, abrasion or trauma, while the exposed dentin of a tooth root is primarily brought about by premature or by senile atrophy of its protective alveolar process.

#### **PATHOLOGY.**

Before entering upon a discussion of the pathology of hypersensitive dentin,

the anatomy and physiology of normal dentin should be briefly recalled. Dentin is made up of about 72 per cent. inorganic salts, about 10 per cent. water, and an organic matrix constituting the remaining per cent. The dentin is traversed by a very large number of tubules measuring from about  $1\frac{1}{2}$  to  $5\mu$  in diameter and radiating more or less wave-like from the pulp cavity toward the periphery, where they branch off, forming a deltoid network. Roemer has counted from 25,000 to 30,000 dentinal tubules within the area of a square millimeter. The tubules are filled with lymph and with the protoplasmic processes of the odontoblasts, as originally described by Koelliker, and known at present as Tomes' fibers. These fibers are structureless threads and are continuous through the full length of the tubules and their branches.

The so-called innervation of dentin is



still a much mooted question. Physiologically normal dentin has no sensation; its vital protoplasm transfers tactile impressions, thermal changes and chemical or electric irritation to the pulp.

As the writer does not possess sufficient expert histological knowledge which would enable him to discuss this question authoritatively, he has asked his colleague, Professor Hopewell-Smith, to interpret the present status of dentin innervation, and he has kindly furnished the following data:

In connection with the much-debated question of sensitiveness of dentin dependent on the existence of a special nervous mechanism within that tissue, two schools of opposing thought and opinion may be cited. The origin of the two groups may be traced to the enormous difficulties associated with the preparation and treatment of material for microscopical examination. The histologist alone can appreciate and understand the perplexities of technique.

It is an interesting and important fact, that it has not yet been proved to the entire satisfaction of all observers that nerve fibers exist in the dentinal tubules. Thus there is a wide difference in men's views as to the innervation or non-innervation of the dentin. One school of belief, headed by Boll, Morgens-tern, Roemer, Bendorf, Fritsch, and Howard Mummery, endeavors to explain sensitiveness in dentin to the occurrence of peripheral nerve fibers in the dentinal tubules. As Howard Mummery puts it: "The nerve fibers enter the dentinal tubule in company with the dentinal fibril." The other school denies the existence of nerve fibers in this tissue. Amongst those included in this group are Retzius, Koelliker, Tomes, Huber, Walkhoff, Gysi, and Hopewell-Smith. By persistent search in teeth of mammals and reptiles no definite nervous system has been demonstrated, the nerve fibers terminating in arborizations around the odontoblasts on the surface of the dental pulp.

Impulses are carried through the dentin to the pulp *via* the contents of the dentinal tubules, *i.e.*, dentinal fibrils—the peripheral processes of the odontoblasts, and lymph. There is an abundance of protoplasm in these innumerable channels. Members of the second school of thought are divided in their views as to the causes of sensation. The hylopathist ascribes it to abnormal movements of the molecules of the dentinal fibrils.

while the others claim that demarcation currents, convection, and osmosis are responsible for pain. All, however, are agreed that the cerebro-spinal nervous system has no share in its production beyond that in the dental pulp.

Exigencies of space preclude the possibility of entering at all fully into descriptions of the claims of these rivals. Taking one only; it is perfectly certain that the use of a nerve sedative, in the ordinary acceptance of that term, is of no avail in the suppression or amelioration of pain in a cavity in the dentin. If nerves existed there it would be reasonable to expect that such a drug would have beneficial effect in the treatment of odontalgia; but such is not the case.

Personally, the writer is in full accord with the concepts of the second school of histologists, *i.e.*, the non-innervation hypothesis of dentin. From a pharmacologic point of view he is able to furnish sufficient data to substantiate this assumption. Basing his own conception upon this hypothesis, he assumes that hypersensitive dentin denotes a state in which the contents of the dentinal tubules are pathologically altered. This change is brought about by external physico-chemical influences which interfere with surface tension, adsorption or imbibition, and diffusion. All three processes are closely allied phenomena.

According to Gibbs' law, all substances which lower the surface tension of a solvent become more concentrated in the surface film than in the interior. It is a phenomenon which depends upon the increase of attraction of the molecules in the surface film for one another and puts the film under pressure. Thereby a hydrostatic pressure is created which materially increases the normal osmotic pressure. As a rule, inorganic neutral salts and many sugars very slightly raise the surface tension, whereas acids, bases and most organic substances lower the surface tension. The colloids concentrated in the surface film become very viscous, finally forming a membrane insoluble in water. Colloidal solutions readily adsorb water and dissolve salts from the surrounding medium. The adsorption of water increases proportionally with the concentration of the salt solution to a certain point and thereby

an increase in the internal pressure of the colloidal solution is obtained.

Surface tension is constantly trying to reduce itself: in a uniform fluid this is impossible, while in a mixture consisting of two or more substances which in themselves possess different surface tension, the lighter fluid has a tendency to collect on the surface of the more tense fluid. Under the influence of these different forces, dynamic equilibrium is established within a certain time.\* These various factors favor mechanical adsorption or imbibition, reduction of surface tension, increase of solubility under pressure and compressibility of water. It is interesting to observe that alcohols, fatty acids, esters and many organic solvents are readily adsorbed.

Chemical adsorption is of less interest in this connection. The only important factor which influences adsorption is the ion concentration of a fluid. The equilibrium of a phase in regard to its ion concentration is controlled by the law of mass action. The relative viscosity of a fluid plays a most important rôle. If the surface of a solution adsorbs a dissolved substance, the viscosity of its surface is markedly increased. As a consequence, albumins, soaps, saponins, dyestuffs, etc., form a surface film which materially interferes with the diffusibility, as compared to pure water, of dissolved substances.

When the colloidal contents of the dentinal tubules become exposed to the fluids present in the oral cavity, their surface tension becomes altered by adsorption and diffusion in accordance with the above enumerated physico-chemical processes; they become overdilated and thereby exert pressure upon the underlying odontoblastic cells. The fluids in the tubules cannot be compressed, as water possesses no elasticity; it represents a rigid column which trans-

mits pressure in the form of motion undiminished in all directions. Any additional pressure which is exerted upon the overdilated surfaces is at once transmitted to the nerve filaments located at the surface of the pulp (the plexus of Boll), *i.e.*, the anatomical threshold of sensation.

Cutting the enamel does not produce painful sensation. As soon as the amelodentinal junction is reached marked pain is usually experienced by the patient. Beneath the amelodentinal junction are located the interglobular spaces of Czermak, which are completely filled with semi-fluid protoplasm. Pressure and heat produced by the revolving bur upon a relatively large surface area of fluid in this region are quickly transmitted to the pulp, and hence pain is felt. Within the area of dentin, which lies beyond this borderline zone, sensation again is lessened until the advancing bur reaches within close proximity of the pulp.

In carious dentin, excavation of the zones of complete disorganization and of decalcification does not produce sensation because the contents of the tubules are destroyed. As soon as the zone of turbidity is reached, again marked pain is manifested. (Fig. 1.) Here the contents of the exposed dentinal tubules are subjected to intense irritation brought about by acidity and other products of bacterial metabolism. The surface tension of the fluids in the tubules is markedly altered, hence the quick response to pressure and thermal influences. Below this zone of turbidity the translucent zone of Tomes is observed in chronic caries. This translucency of dentin is the product of a vital reaction. The chronic irritation of the odontoblasts causes the pulp to promptly respond by depositing adventitious dentin within the lumen of the tubules, which necessarily lessens their diameter in varying degrees or even produces complete obliteration. Hence a smaller surface of the tubular contents is exposed to the advancing bur and, consequently, lessened sensation is felt. The gradual reduction of surface area of the dentinal tubules is a physiological process in the life circle of a tooth, hence

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\* Decrease in surface tension is readily demonstrated by the following simple experiment: To 100 cc. of absolute alcohol contained in a graduated cylinder add 100 cc. of distilled water. After equilibrium is established the mixture measures only 192 cc.

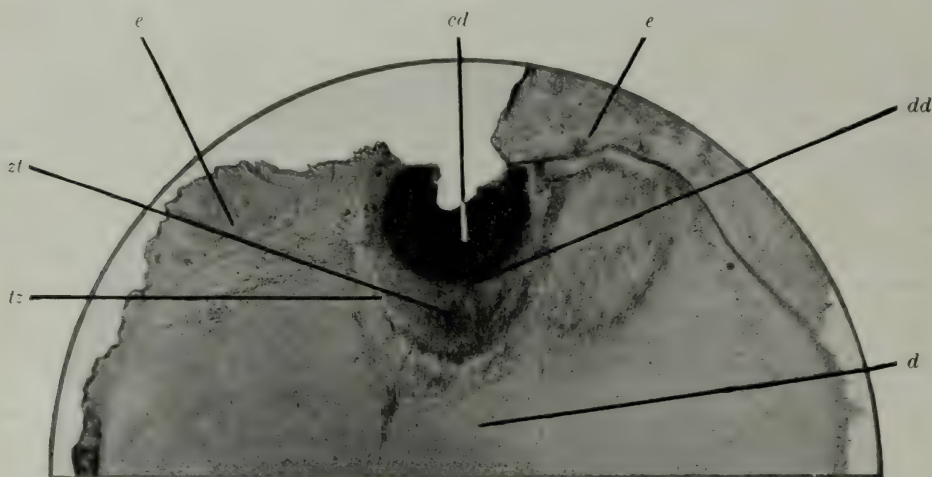


sensitiveness diminishes with advancing age.

Mechanically abraded teeth, or those subjected to the as yet little known process of erosion, are rarely hypersensitive in the later stages. Abrasion and erosion are usually intensely chronic processes, hence their very slow progress offers to the irritated odontoblasts sufficient time to deposit adventitious dentin within the tubules and thereby protect the underlying pulp from further irritation. Sec-

Dehydration of the overdistended tubules by physical means relieves the hypertension, consequently, such an agent as warm air reduces the sensibility. Alcohol, potassium hydroxid, or similar hygroscopic chemicals, act synchronically as dehydrants and caustics. Self-limiting caustics, as silver nitrate (Fig. 2 A and B), perhydrol, etc., superficially destroy the vitality of the protoplasmic fibers, and protect the contents of the tubules by solid plugs of precipitated

FIG. 1.



Section of a carious tooth: *e*, enamel; *d*, dentin; *cd*, carious dentin; *dd*, decalcified dentin; *zt*, zone of turbidity; *tz*, translucent zone. (*Photomicrograph by Hopewell-Smith.*)

tions of mechanically or chemically abraded teeth containing living pulps always show a translucent zone.

As stated above, the process of removal of the enamel of a sound tooth by cutting and grinding, if done under proper precautions to avoid undue heat, is usually not painful. The freshly exposed dentin is relatively free from sensation. Within a short lapse of time, however, usually within twenty-four hours, this exposed dentin is excruciatingly hypersensitive. The exposure of the contents of the tubules to the fluids of the mouth, as explained above, changes the surface tension so as to cause pronounced irritation of the odontoblastic cells.

albumin. The disturbing elements are thereby permanently excluded from reaching the dentin. The disarranged equilibrium of the tubular fluid readjusts itself in a short time and, consequently, hyperesthesia is relieved. A substantial illustration of this fact is furnished by immediately protecting artificially exposed dentin with a coating of silver nitrate or a temporary cap set with gutta-percha and *not* with an irritating cement. Such dentin will exhibit no particular sensation at any time after the operation.

Any general condition which lowers the normal psychic reaction of a patient as a whole, naturally also influences the reactivity of the tooth pulp. Therefore,



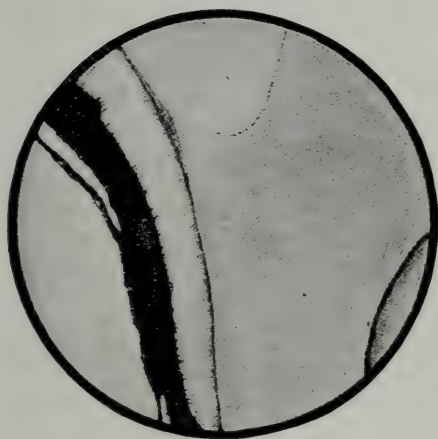
such disturbances as acute nasal catarrh, influenza, exanthematous fevers, increased intradental blood pressure, menstruation, anemia, general debility or certain neuropathic conditions, as neurasthenia, may leave their imprint upon the pulps in the form of congestive hyperemia and, consequently, any irritation of the exposed dentin of a tooth under these conditions is prone to exhibit indirectly excessive sensibility.

plexus of Boll, the anatomical threshold of sensation.

#### SYMPTOMS AND TREATMENT.

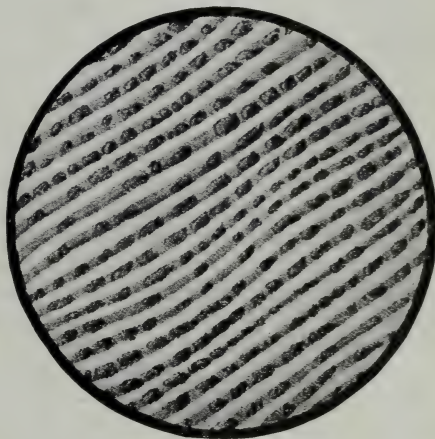
The principal subjective symptom of hypersensitive dentin consists in more or less severe pain which is usually elucidated by marked temperature changes, chemical irritation or mechanical interference of the denuded dentin surface.

FIG. 2



A

A, Silver nitrate applied to carious dentin upon the living tooth in the mouth. Low power. (After Szabo.)



B

B, Magnified section of A.

From the above discussion of its pathology, the writer concludes that hypersensitive dentin designates a state of irritation of the odontoblasts of a vital pulp. Irritation is produced only by external agents, *i.e.*, physico-chemical processes induce changes in the surface tension (hypertension) of the exposed contents of the tubules. The increased reactivity of the disturbed equilibrium transmits any additional physical or chemical impulse at once *via* the Tomes' fibers to the congested odontoblastic cells covering the pulp and which are in direct contact with the nerve fibers of the

The pain is *not* continuous, it merely lasts as long as the irritant is present. Inspection may reveal a carious or other defect of the crown of the tooth, an exposure of its root, or frequently an incomplete union at the periphery of the enamel and cementum at its neck. The thermal test with hot and, especially, cold water or pressure exerted by an instrument placed upon the exposed dentin surface is very pronounced. Changes in the color of the tooth, percussion, palpation and roentgenogram are negative. Hypersensitive dentin offers good chances for conservative treatment;

under proper management it may readily be eradicated.

The rational principle of treatment should be based on the recognition of its pathological cause, *i.e.*, hypertension of the contents of the dentinal tubules. Any method or means which favors the readjustment of the altered colloidal equilibrium and prevents further irritation of the exposed dentin surface is useful for the purpose.

In general the remedies employed should conform to the following requirements:

1. The remedy must not injure the organic or inorganic constituents of the tooth.
2. The remedy must not permanently interfere with the welfare of the pulp.
3. The administration of the remedy must not require a complicated instrumentarium.
4. The pharmacologic action of the remedy must be exhibited within a few minutes.
5. The remedy must be readily applicable to all classes of cavities with regard to their location.
6. It must not produce pain.
7. Permanent discoloration of dentin must not occur.

For convenience, we may divide the applied remedies into:

- A. Physical and chemical procedures:
  1. Keen-edged instruments.
  2. Caustics.
- B. Local and general remedies:
  1. Local anesthetics and sedatives.
  2. General anesthetics and sedatives.

#### SHARP INSTRUMENTS.

The superiority of sharp instruments as compared with dull, ragged-edged tools when working upon living tissue is generally recognized by everyday experience. Sharp excavators cut without much pain when employed with a definite, precise movement at right angles to the long axis of the tubules. Dull engine burs produce heat by friction and

by being held in contact with the cavity wall too continuously. Burs should not only be sharp, but run at high speed and allowed to touch the surface very lightly as they revolve. A thin coating of vaselin further reduces undue friction.

#### CAUSTICS.

Caustics are substances which destroy living tissue by virtue of their coarse chemical or physical action. This action may manifest itself by abstracting water from albumin, by dissolution or precipitation of the albumin, by oxydation or by substitution. Caustics, which are employed for the purpose in view, are principally dehydrants and albumin solvents or precipitants. Alkalies containing hydroxyl groups, KOH and NaOH, are very powerful albumin solvents and they are not self-limiting. The albumin precipitants are primarily represented by the metallic salts, by certain organic compounds, as phenol, alcohol, etc., and by heat. Mineral acids should not be applied on living tooth structure for such purposes. The precipitates obtained by metallic salts differ widely in regard to their density; silver nitrate, for instance, produces a dry, dense, scab, while zinc chlorid combines with the albumin to form a loose, flocculent clot.

As we have stated above, hypertension of the contents of the dentinal tubules is the primary cause of hypersensation in denuded dentin. The removal of this tension will necessarily interfere with or prevent the transmission of an impulse; hence the simplest and most logical method of reducing hyperesthesia of dentin for the purpose of excavating is to dispel the moisture from the tubules. It has been found that desiccation of a cavity by subjecting it to a current of warm air in conjunction with absolute alcohol will bring about a condition of immunity to sensation in proportion as such desiccation is thorough or partial. To best accomplish desiccation of the dentin, the rubber dam should be adjusted to the tooth and the greater portion of the carious mass carefully removed with



spoon excavators; the cavity should be bathed with absolute alcohol\* and then subjected to a stream of warm air applied in some convenient manner. The ordinary air syringe or chip blower with a point that can be heated in a flame or an electrically heated syringe or other modification are available for this purpose. The air supply may be obtained from a rubber bulb or a compressed air tank. Whether we depend entirely upon dryness to relieve hypersensation of dentin or not, it should always be resorted to, for it proves a most valuable preliminary means where it is to be followed by medication of any kind.

Caustic alkalies are preferably applied in the well-known form of Robinson's remedy, which is composed of equal parts of potassium hydroxid and crystalline phenol, forming potassium phenate when triturated together in a warmed mortar, with the addition of a very small quantity of glycerin to render it plastic. It should be preserved in well-stoppered bottles. A small quantity of this compound applied to the previously dehydrated painful dentin surface and rubbed into it with a warm burnisher will often prove to be of benefit. An intimate pasty mixture of potassium carbonate, four parts, and pure glycerin, one part, to be kept in a tightly corked bottle, has also been much lauded. The writer is rather partial to this mixture. The caustic and dehydrating effect of these agents combined with the warm air blast lowers hyperesthesia markedly. Their benumbing action, however, is only superficial and they have to be repeatedly applied as the preparation of the cavity proceeds.

Albumin precipitants are principally represented by silver nitrate, zinc chlorid, and phenol. The silver salt acts very superficially and very slowly. Incidentally, by combining with the chlorin present in the albumin and in the presence of light it produces jet black dis-

coloration of the involved dentin. On all exposed dentin surfaces, especially on the exposed roots of the posterior teeth where the resultant color is no objection, it is an admirable desensitizer. It is best applied as a freshly prepared, saturated, aqueous solution. Other silver salts are of less value in this connection, as they are less caustic.

It should be remembered that the pharmaco-dynamic action of silver nitrate depends upon the precipitation of albumin by the nitric acid ion and *not* upon the silver ion. The latter merely combines with the albumin forming a complicated double salt, silver-albumin chlorid, which in the presence of light is partially reduced to a black oxid.

Zinc chlorid is a serviceable desensitizer; its application in crystal form or as a saturated solution is somewhat painful on account of its acid reaction. As it is not self-limiting, it should not be applied in deep-seated cavities on account of the danger of pulp irritation at the time of its application or subsequently.

Liquefied phenol does not penetrate deeply into tooth structure and may be safely applied to cavities of any depth. When applied in a dehydrated cavity in conjunction with the warm air blast it produces quick and marked superficial benumbing effects, hence it is widely employed for this purpose. The addition of local anesthetics to phenol for this purpose, *i.e.*, cocain, etc., is an irrational procedure.

Within the last few years Buckley has lauded dry formaldehyd (trioxymethylen) in the form of a paste as: "A new, safe and reliable remedy for hypersensitive dentin." This empirically compounded paste contains approximately thirty-five per cent. of dry formaldehyd rubbed up with vaselin and a few minor substances of no direct value. International dental literature of the last decade is filled with references relative to the use of formaldehyd as a desensitizing agent and all writers, except Buckley, agree that it is a most dangerous agent for this purpose, as it will injure and in most instances kill the pulp. It pro-

\* Absolute alcohol for this purpose may be prepared by adding either one-half ounce of anhydrous copper sulfate or an equal quantity of well-burned unslaked lime to three ounces of commercial alcohol.



duces numbness of dentin in the same manner as arsenic, only acting somewhat slower. Trioxymethylene, acts as a non-self-limiting caustic which penetrates comparatively quickly through any thickness of dentin. As an illustration of the intense caustic action it may be stated that, in the hands of some practitioners, the Buckley desensitizing paste constitutes the routine application for the purpose of destroying the pulps in deciduous teeth. The same deleterious results are obtained with the so-called "Norwegian Dentin Anesthetic." This compound contains carpain and paucin, two alkaloids which act somewhat like erythrophlein, *i.e.*, they kill the pulp.

Occasionally, protoplasm poisons are recommended for the purpose of desensitizing dentin. In many instances, these drugs are erroneously referred to as caustics. A protoplasm poison should be designated as a drug which endangers, or even kills, living cell structure without visible changes. Protoplasm poisons are not self-limiting in their action. Arsenic trioxid and, to a less extent, the alkaloids, nervocidin, erythrophlein, and paucin, are the principal substances of this group that have been employed as desensitizing agents. Arsenic, when applied even in the very minutest quantities, will usually kill the pulp, as its action cannot be controlled. This is equally true of the above-named alkaloids; they have only historical interest at present.

#### LOCAL ANESTHETICS AND SEDATIVES.

True local anesthetics, *i.e.*, cocaine or its substitutes, when applied to exposed sound dentin without pressure, do not produce any pharmacologic effects. Even if sealed into a fairly deep-seated cavity in which the underlying dentin is not decalcified no effect is obtained. Living protoplasm reacts unfavorably against the ready absorption of substances by endosmosis for two reasons: First, the albumin molecule is relatively very large and is not easily diffusible, and, secondly, it possesses, as an integral part of its life, vital resistance toward foreign

bodies. According to Hertwig, protoplasm primarily transfers irritation and, secondly, transmits absorbed materials. Therefore, the anesthetic solution has to pass through the entire length of the dentinal fiber before the nerve tissue of the pulp proper is reached. Conse-

FIG. 3.



Photomicrograph of a longitudinal section of a healthy tooth treated in the mouth with a protoplasm poison and a vital stain.

The pulp was vital as ascertained by the electric current. At *a* a cavity was drilled and a small quantity of formaldehyd desensitizing paste containing one per cent. of methylene-blue was sealed into it for three days, after which time the electric current revealed a dead pulp. Between *a* and *b* the bluish-green stain indicates the path of the formaldehyd on its way through the dentinal tubules into the pulp. At *c* the coronal portion of the latter is also stained. As methylene-blue only stains dead dentin, it closely followed the formaldehyd on its devitalizing passage through the tubules into the living pulp.

quently, a certain period of time is required before the physiologic effect of the anesthetic is manifested and the period of this latency is dependent on the thickness of the intermediate layer of dentin. The migration of a protoplasm poison through dentin may be actually observed by adding a vital stain to it, as, for instance, methylene-blue added to arsenic or dry formaldehyd. (Fig. 3.)

The time required for its passage through about five millimeters of sound adult dentin is twenty-four or more hours.

The pharmaco-dynamic power of a drug depends upon its reaction with the protoplasm through the catalytic action of ferments. The decomposition of the absorbed drug occurs comparatively quickly, usually within minutes. These observations may be made daily on injecting anesthetic or other solutions hypodermically. An average hypodermic dose of cocain is completely decomposed by the ferments of the protoplasm within the period of an hour, that is, its typical local anesthetic effect is manifested within a few minutes after the injection. The anesthesia remains at its height for about thirty minutes, and from then on it diminishes until by the end of the hour there is fairly complete recovery of normal sensation. Therefore, if we apply cocain to sound dentin, it is decomposed on its passage over the Tomes' fibers and *before* it reaches the anatomical threshold of sensation, *i.e.*, the nerve plexus at the surface of the pulp, and hence no anesthesia is produced. The nature of the cocain salt, whether it is a hydrochlorid, nitrate, or lactate, has no bearing upon its therapeutic action. The apparent results obtained with these cocain salts must be attributed to the preliminary dehydration or protection of the exposed dentin by a temporary filling, etc., and *not* to its therapeutic effect. This is equally true in regard to most of the heterogeneous mixtures of cocain with other substances, as, for instance, potassocoin, vapocain, etc. Again, in the widely recommended solution of cocain (alkaloid) in chloroform and ether, the cocain base plays no part. The apparent results obtained are produced by the process of "evaporating to dryness" and thereby obtaining a marked reduction in temperature which is the obtundent factor.

When cocain, or its substitutes, is forced into the living protoplasm of the unobstructed dentin tubules under pressure, its anesthetic action is manifested within a few minutes. The vital re-

sistance of protoplasm is readily overcome by comparatively slight force which quickly transfers the anesthetic solution by an increased osmotic interchange to the surface of the pulp. The phenomenon is to be explained as an anesthesia obtained by intimate contact under pressure, either mechanical or by electro-motive force (cataphoresis).

The pulp of a tooth and, consequently, the dentin, may be completely desensitized by any one of the well-known methods of contact anesthesia by using hand pressure or that derived from a dental hypodermic syringe, or some other more complicated apparatus or by electricity. As these various methods are now common procedures in the hands of the clinical practitioner, they do not need to be further discussed at this time.

Of the numerous essential oils which have been suggested as obtundents of dentin, oil of clove stands out prominently. Its pharmacological action depends on the presence of eugenol, an unsaturated aromatic phenol. The basic constituent of eugenol consists of para-amido-benzoic acid, a body which as such does not exhibit any marked therapeutic effects. Its methylester, anesthesin, is an efficient local anesthetic; however, it is only slightly soluble in water. Einhorn and Uhlfelder, taking anesthesin as a base for their synthetic research, finally succeeded in preparing para-amido-benzoyl-diethyl-amino-ethanol, commercially known as novocain or procain, which at present is the most efficient substitute for cocain.

Essential oils, in general, possess marked penetrating power. However, upon a fairly thick layer of sound dentin they are of little value when employed as obtundents. A different pharmaco-dynamic action is observed with arsenic. Arsenic trioxid,  $As_2O_3$ , in the presence of certain ferments of living protoplasm, *i.e.*, oxydases and catalases, is changed to the pentoxid,  $As_2O_5$ , which again is quickly reduced to the trioxid. This continuous oxidation and reduction within the protoplasm of the cell causes a violent oscillation of the molecule of active oxygen and thereby its



therapeutic effect is manifested. The metalloid arsenic merely plays the rôle of an autoxidizer. The presence of the absorbed arsenic can be detected in the tissues by chemical analysis, but that of absorbed cocain cannot.

Among the local sedatives refrigerant anesthetics should be mentioned. These agents lower the temperature, diminish sensation, and reduce the volume of the parts to which they are applied.

Physically reducing hyperesthesia of dentin by the application of cold is best accomplished by employing a chemical which has a low boiling point. Pure ether (boiling point  $95^{\circ}\text{F.}$ ,  $35^{\circ}\text{C.}$ ), free from water, produces good results. Certain other hydrocarbons possess similar properties in varying degrees, depending on their individual boiling point. Pure ethyl chlorid (boiling point  $55^{\circ}\text{F.}$ ,  $13^{\circ}\text{C.}$ ) is best suited for our purpose, as it lowers the temperature of the tissues sufficiently to produce a short superficial anesthesia in a few minutes. Too rapid cooling or prolonged freezing produces deep anesthesia, but such procedures are dangerous, as circulation in the pulp may be cut off so completely as to produce death. Liquefied nitrous oxid, liquefied carbon dioxid, and liquefied air, all of which have a boiling point far below zero, are recommended for such purposes, but they require cumbersome apparatus and some of these agents are extremely dangerous to handle.

In general, it should be stated that the application of cold for the purpose of obtunding hypersensitive dentin is a barbaric procedure. The initial pain produced by the cold is in many instances most intense and much more pronounced than that experienced by cutting the untreated dentin.

Indirectly, hyperesthesia of dentin may be completely eliminated by locally blocking the sensory nerve fibers leading to the pulp of the affected tooth. Any of the well-known methods or combination of methods, *i.e.*, infiltration and conduction anesthesia, are available for this purpose. On an average, most satisfactory results in a single tooth are

obtained by using the pericemental injection, provided the pericementum is sound.

The paralyzation of the central end-organs in the brain by a general anesthetic will naturally also anesthetize all the tooth pulps. Nitrous oxid is possibly more often used for this purpose than other anesthetic agents. The much-lauded "analgesia" of a few years ago was, as might have been expected, a failure. With the improvement in the various methods of local anesthesia, general anesthesia for this specific purpose has lost much of its former significance.

The control of hypersensitive dentin by the administration of narcotics or sedatives is rarely called for. Of the general sedatives, the bromids are usually recommended. Large continuous doses are required to manifest their action, as they impair the perception of sensory stimuli only to a very mild degree. Average doses of morphin require at least one-half hour before a depression of the sensory impulse is manifested, while chloral hydrate shows a marked lowering within 10 to 15 minutes. Morphin-scopolamin administered hypodermically causes most pronounced general narcotic effects and, of course, marked lowering of the sensory reaction of the pulp.

Sensation in a tooth may be experimentally measured by passing a weak electric induced current through it, and the above data are based upon observations obtained by such measurements.

Recently the writer has been informed that certain practitioners advocate "painless" operations about the teeth by administering such powerful narcotic mixtures as morphin-scopolamin (hyoscin), sold under various trade names. These drugs are intended to imitate what is known in general surgery as "twilight sleep." Such procedures are eminently dangerous. It should be remembered that "doses of these drugs, which without the aid of one of the gaseous anesthetics cause a narcosis of sufficient depth, carry with them greater dangers than any of the other various methods of producing anesthesia." The writer



most emphatically discourages such practice. The dentist who, on account of ignorance, administers powerful narcotics of this type may suddenly find himself entangled in the meshes of the law.

The writer is under lasting obligations to Professor Hopewell-Smith for his interpretation of the so-called innervation of the dentin and the photomicrograph of the carious tooth and to Professor Lodholz for helpful criticism of the general physiologic concept embodied in this paper.

In accordance with the above-advanced hypothesis of the pathology of hypersensitive dentin, the writer is convinced that the search for a so-called dentin desensitizer, which by mere con-

tact will exhibit its action in the same pharmaco-dynamic manner as that of a local anesthetic, is equally as hopeless as the attempt to solve the problem of *perpetuum mobile*.

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 FORTIETH AND SPRUCE STS.

## Technique for the Construction of a Hand-carved Porcelain Shell Crown.

By CHARLES K. BUELL, D.D.S., Buffalo, N. Y.

(Read before the annual meeting of the New Jersey State Dental Society, Atlantic City, July 16 to 18, 1919.)

I HAVE chosen this subject as it seems opportune when so much attention is being given to the conservation of the dental pulp.

This type of crown surpasses all others, as it places at the cervix a material which is received very kindly by the tissues, can be made so as to conform perfectly to the anatomy of the tooth and places between the pulp and all external influences a non-conducting material which protects it from all shocks due to thermal changes. The possibilities in imitating form and color under all circumstances are limited only by the skill of the operator.

The use of the porcelain shell crown

is indicated on all teeth that require crowning, with the possible exception of the third molar.

#### PREPARATION OF THE TOOTH.

Incisors and cuspids require the removal of the enamel only in most cases. This is best accomplished:

*First.*—By the use of a thin carborundum disk, cutting a groove from the incisal end to the cervix, thus removing a slice from the mesial and distal sides, as in Fig. 1 A. (Note the shoulder at the cervix.)

*Second.*—Longitudinal grooves are cut just through the enamel on the labial

side from the incisal end to the cervix, then transverse grooves from the mesial to the distal side, extending all of these grooves just through the enamel. (Fig. 1 B.) (Note the little squares of enamel remaining.)

*Third.*—The incisal end is cut off to the desired length.

*Fourth.*—Longitudinal and transverse grooves are cut on the lingual side in the same manner as on the labial.

*Fifth.*—All of the little squares are next ground away with a broader car-

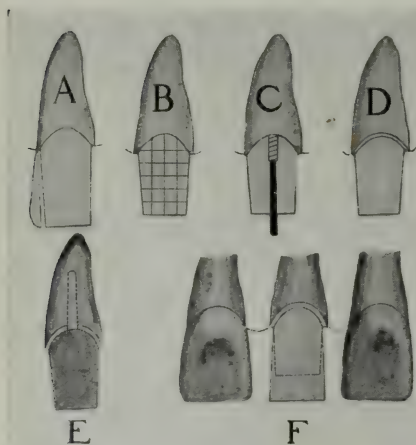
tached in its place with shellac keeps the stone moist, protects the tongue or lips, and collects all débris.

This crown may also be applied to any devitalized tooth by simply making a cast core of pure silver or 22-k. gold, anchored with one or two posts as the case may require. (Fig. 1 E.)

#### SELECTION OF SHADES.

The best method of matching the color of the adjacent teeth is to select from a tooth shade guide a sample tooth that will match these teeth, then with this tooth held in the fingers, so that the cervical end only shows, select from the porcelain shade guide a sample shade that will match this cervical color. Change ends with the sample tooth, so that the incisal end only shows and match this in the same manner. It is a rare case that will require the mixing of colors if the Consolidated high-fusing porcelain is used, but it may be done when necessary.

FIG. 1.



borundum stone until the surface is again smooth.

*Sixth.*—A shoulder is now cut just underneath the free margin of the gum by the use of small cylinder carborundum stones, followed by cross-cut fissure burs and cylinder porcelain inlay burs, leaving a well-defined shoulder with a clean-cut smooth angle. (Fig. 1 C and D.)

All grinding is done with a wet stone, while grinding away the enamel in grooves makes the operation practically a painless one, which can be accomplished in a very short time. An old mouth mirror from which the glass has been removed and a piece of sponge at-

#### MAKING THE MATRIX BY THE DIRECT METHOD.

A dentimeter measurement is taken just above the shoulder and straightened out. A piece of soft platinum 1/1000 of an inch in thickness is then cut, wrapped into a cone with a lap joint and soldered with platinum solder. (Fig. 2 A.) This cone is then trimmed to fit the contour of the tissues at the cervix, trying and trimming until it fits snugly over the shoulder. The labial side is first adapted to the shoulder with a thin wedge-shaped piece of soft pine, directing the burnishing from the incisal end toward the cervix, forcing whatever excess there may be toward the approximal sides. (Fig. 2 B.) The lingual side is treated in the same manner. The excess at the sides, if too great, is trimmed away, then folded over and the sides burnished with the soft pine, followed by S. S. White burnishers until the platinum is perfectly adapted and smooth. The incisal end is now trimmed,

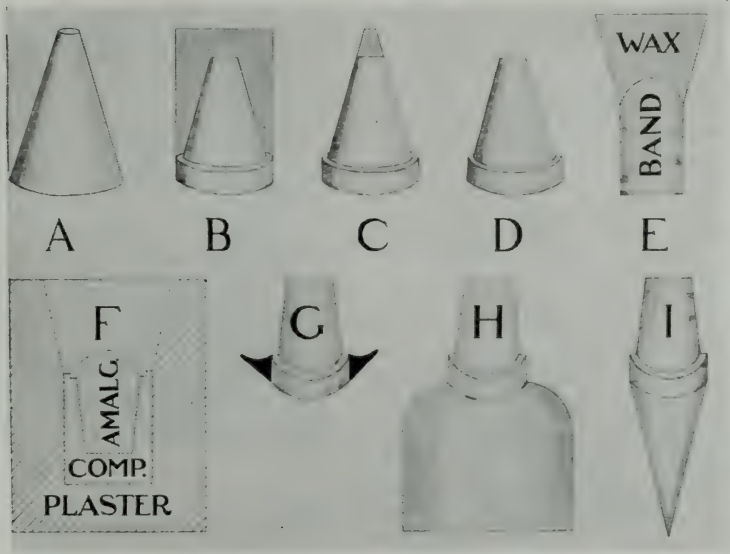
if necessary, folded over and carefully adapted. (Fig. 2 c and d.)

# MAKING THE MATRIX BY THE INDIRECT METHOD.

Select a copper band that will go over the stump and trim it to fit where it comes into contact with the shoulder. Fill this with softened Detroit compound and force it to place on the stump of the

Take a strip of cardboard, one inch wide and three inches long, roll into a ring placing a rubber band around same to hold it in position. Fill with plaster and settle the ring with wax around it into plaster, wax-end up. (Fig. 2 f.) Pack amalgam into this mold, forming an amalgam model of the tooth to be crowned. Allow the amalgam to set over night, then remove plaster and wax and make a tin foil pattern, which after

FIG. 2.



tooth, chill and take a plaster or compound impression with band in position, removing the band and placing it in its proper place in the impression should it not come away when the impression is removed. Lay this impression away for future use. Take a modeling compound or wax bite and lay it away also.

Select another band that is slightly larger in circumference than the tooth just above the shoulder, trim this carefully to conform to the gingiva, place in position, warm a cone of Detroit compound leaving the base of the cone cold and force it into the band, holding firmly in place until chilled; remove and wrap thin wax around the band as in Fig. 2 e.

adaptation will be found to be shaped approximately as in Fig. 3 d. Straighten out and cut 1/1000 platinum to this pattern, and wrap around the amalgam model, making a tinner's lap joint at the side. Adapt first with soft pine, then with burnishers and complete the adaptation the same as in the direct method. Place the amalgam model in the impression that was previously laid aside, in its proper position, attach with wax if necessary to hold it securely, and run a plaster model. Place the bite upon this model and attach it to a crown articulator.

The impression and bite for the direct method is taken with Detroit compound



immediately after the matrix is adapted. Should the matrix not come away in the impression, it is carefully removed and placed in its proper position, coated with a thin film of beeswax and a generous amount placed around the matrix at the cervix, as in Fig. 2 G—the heavy shading indicating the thick wax. The plaster is poured into the impression and placed on the crown articulator. After the plaster has set and the compound has been removed, the model is trimmed to allow for the shrinkage of the porcelain. Consolidated high-fusing porcelain is used for this crown and we know that it will shrink one-sixth its bulk, which being divided equally will necessitate the removal of one-twelfth of the width of the space from each of the adjacent teeth. Any overhanging plaster that may tend to hold the matrix in position on the model is carefully cut away, the matrix warmed and carefully removed.

From this point on, both direct and indirect methods are the same, with the one exception that the matrix is re-adapted on the amalgam model after the first firing in the indirect method, while in the direct method the readapting is done in the mouth.

The matrix is again coated on the inside with a thin film of wax, then filled with soft plaster and set upon a mass of plaster, as in Fig. 2 H. When this plaster is thoroughly set, it is carved into a cone resembling somewhat the root of a tooth, the length of the cone and the angle of the bevel determining the width of the crown, both mesio-distally and labio-lingually, when finished. (Fig. 2 I.) Heat the matrix and remove from the plaster cone, burn out all wax and replace the matrix upon the plaster cone, after giving it a thin coating of shellac on its external surface.

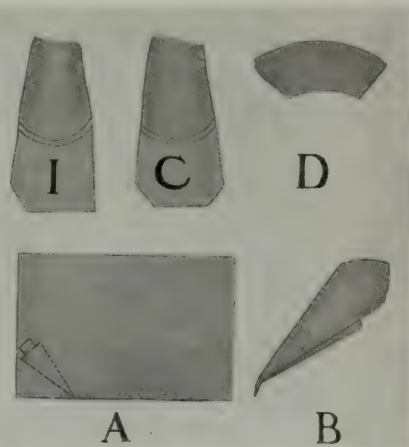
Select a piece of glazed paper about 2 x 3 inches and beginning at one corner, as in Fig. 3 A, wrap the paper around the plaster cone forming a cornucopia, and fold up the bottom to facilitate holding it in position. (Fig. 3 B.) In selecting the shade, note was made of the distance the yellow shade in the adjacent teeth extended down from the cer-

vix, so the cornucopia is cut off at just this point.

#### ADVANTAGES OF THE CORNUCOPIA METHOD OF APPLYING PORCELAIN.

By this method density of porcelain is easily obtained. Definite blending of colors is readily accomplished as well as accuracy of form, and stability while handling, facilitating the carving.

FIG. 3.



#### APPLICATION OF PORCELAIN.

The cervical and incisal colors are prepared to the consistence of thick cream upon the mixing slab and the cornucopia filled full of the cervical color. The moisture is absorbed from the surface with a napkin or blotting paper, while the cone is repeatedly jarred by drawing a serrated instrument across the cone, bringing all of the moisture to the surface. This process must be continued until no moisture appears upon the surface of the porcelain.

#### CARVING THE PORCELAIN.

Remove the paper and carefully lift the matrix from the plaster cone; should there be any porcelain on the inside remove it with a small brush moistened

between the lips. Place the matrix in its proper position on the model, trimming the porcelain wherever it is necessary to allow its going into place. For incisors and cuspids the labial side only is carved, as in Fig. 3 1, while in bicuspid and molars the carving extends all around the tooth so as to form a lapping of the porcelain, thus blending the colors. (Fig. 3 c.) Remove from the model and replace on the plaster cone, wrap with paper again, this time trimming the cornucopia one-eighth to one-sixteenth of an inch longer than the finished crown is to be. This can be easily determined as a note was made of the distance from the end of the yellow porcelain to the incisal end of the adjacent tooth while on the model. Place in the cornucopia a generous portion of the incisal porcelain in the consistence of thin cream, jar slightly until it settles down into place, then add more porcelain from which the water has been absorbed, until the cornucopia is filled to the top, continuing to jar and absorb the moisture as before, until none appears on the surface. Remove the paper and again place the matrix in position upon the model, trimming wherever necessary to allow its proper seating. (Examine the matrix carefully to see that no porcelain is on the inside.)

Carve the porcelain now until the articulator may be closed to within one-sixteenth of an inch, or one-sixth of the length of the tooth to be crowned. Carve the labial and lingual sides to conform to the contour of the adjacent teeth. Remove from the model, place on the plaster cone and finish the carving, rounding off the sharp angles with the ball of the finger and in the case of bicuspid and molars carving the sulci and all of the fine markings required by the case in hand. Brush away all chips with a camel's-hair brush and set upon a fire-clay support for firing.

#### FIRING.

The crown must be placed before the door of the furnace and allowed to gradually dry out, after which time it may be placed within the furnace and a preliminary or biscuit firing made. The temperature of the furnace should be adjusted so that at least ten minutes is occupied in this preliminary bake, after which it is removed from the furnace, placed upon the amalgam model or upon the root in the mouth and the matrix readapted at the cervix wherever necessary. Should the crown be too large at any point, it may be ground, being careful to wash away all grit from the carborundum stone; or should it be deficient, more porcelain may be added when the space made by readapting the matrix is filled in.

The final firing should take fifteen minutes at least, and the crown remain in the furnace to cool as the furnace cools.

#### REMOVAL OF THE MATRIX.

The removal of the matrix will be greatly facilitated if the crown is kept thoroughly wet while the matrix is being rolled away from the sides and not pulled away.

The finished crown is now ready for cementation. The stump should be varnished and the crown gently forced into place with a cement mixed to a thin creamy consistence.

If we have attended carefully to the detail of each step in its construction, we will have given our patient the best that is in us and the highest type of crown obtainable.

131 ALLEN ST. \_\_\_\_\_

[See also *Discussion*, as reported under "Proceedings of Societies," this issue.]

## Trifacial Neuralgia.

By CARLTON N. RUSSELL, M.D., Philadelphia, Pa.

(Read before the North Philadelphia Association of Dental Surgeons, November 12, 1919.)

WHEN we speak of neuralgia, the term immediately implies a condition of pain which is characteristic, manifesting itself in varying stages of intensity, from a mere suspicion of distress to a condition of indescribable torture. Primarily it is not a disease, nor even a morbid state in the sense of having an individuality, but the nerves act in the capacity of expressing pathological unrest in some part of the economy, which may be general or localized. Later, however, from long-continued irritation, the nerve trunks may undergo degeneration, which when once fully established becomes an entity in itself.

The fundamental cause from which neuralgia occurs is any condition by which physical nourishment has been reduced. The preponderance of cases arising in middle life and increasing in advanced age strongly substantiates this claim. The various anemias occupy prominent positions as etiological factors. Arterio-sclerosis and all the causes which are responsible for this state of the vascular system, such as rheumatism, gout, syphilis, focal infection, alcoholism, age, etc., are worthy of commensurate attention.

The cause may be traced, not infrequently, to various forms of visceral irritation, and this is especially true in women suffering from abdominal diseases, or those upon whom operations have been performed in that region. Double oöphorectomies, and hysterectomies lend their peculiar wake of symptoms, which become concomitant with and aggravate neural phenomena occurring in other parts of the body.

Hysteria is frequently a most confusing companion, accompanying a true nerve pathology, and in many instances it is difficult to alienate it as a contributing factor. Exacerbations of severe neuralgias commonly occur in the early winter months or in the spring. This is especially true in the trifacial variety, as many cases which have been latent during the summer and fall, spring into activity on the advent of winter and continue until the so-called settled weather, when the severity of the recurrences abates and the patient may enjoy periods of almost complete rest.

Constitutional disorders from causes not so apparent, seem also to originate or conduce to the disease. Cases of neuralgia are habitually seen associated at least with those deprivations of the digestive apparatus, bearing the nearest affinity to or even the semblance of identity with the multitudinous protean affections, which by a sweeping generalization are embraced under the vague term of dyspepsia. While this is conceded, it is no less true that it may be produced by lesions of any of the internal organs or system of organs, and especially of the uterus, by which the general condition of health is impaired. There is great reason to suspect that a bad habit of body brought on by the depredations of gout, either lays the foundation of, or more directly excites, some of the attacks. It is probable that not a few of the cases do thus originate from arthritic influences.

The predisposition to neuralgia is so strong in some habits that the most trivial accident is sufficient to give rise to the complaint. It attacks most fre-



quently persons of the nervous temperament, and all agencies which tend to develop that temperament more or less contribute to induce it. Thus neuralgia attacks females more frequently than males, and prevails more among the inhabitants of crowded cities than of country districts. Like other nervous affections it is observed more commonly among refined and highly civilized communities. The malady, however, is no stranger in the abodes of misery and destitution, where exist the numerous causes to aggravate this malady, such as worry, exposure, debilitated system from limited and inferior nourishment, impure air, abuse of alcohol, and the like. Frequently there appear cases which indicate a hereditary predisposition, as it has been observed to attack persons whose family shows taints of nervous disorders, insanity or epilepsy. Exposure to cold, especially when the patient has been directly in the line of a stream of cold air for long periods, such as open windows or doors, has undoubtedly proved an exciting cause.

Many cases arising from trauma frequently come under observation, but unless there follow some sequelæ, such as pressure from bone injuries or cicatrices, the condition usually subsides with the disappearance of the inflammation. Long-continued pressure, however, is associated with more disturbing symptoms. Several cases have come under my observation of telephone girls, where neural phenomena of the trifacial and the facial nerves have been occasioned by the pressure of the head instruments which are worn daily for several hours. Again, three motormen complained of sciatic distress, which was doubtless brought about by the pressure upon the sciatic nerve by the small seat provided for them.

The preceding are the principal of the remote causes of neuralgia in its several modifications, and which often are brought into action without the interposition of any further agency. The latent predisposition is sometimes obviously awakened, and in a case only suspended it may be immediately re-

vived by an exposure to cold and moisture, or a draft of cool air or a pressure so slight as adjusting nose glasses.

These are but a few of the many general causes which might be enumerated, but for our purpose it is quite unnecessary to proceed further along those lines, and as a matter of fact it is with some misgivings that these few causes have been mentioned, as they appear somewhat foreign to those which would interest the dentist. The object, however, is to guide your thoughts away temporarily from the field in which the dental practitioner would most naturally seek the cause for a facial neuralgic disturbance, and to suggest the possibility that the stimulating factor may be lodged in some distant and unsuspected part. The character of neuralgia about which I particularly wish to speak is that type which we commonly classify as *tic-douloureux*.

It might be appropriate here to enumerate some of the possible causes of trifacial neuralgia localized in and about the head. I shall insert a classification which I believe was compiled by Dr. Brown. Among the *Intra-cranial* are mentioned: (a) Arterio-sclerosis; (b) aneurysms; (c) tumors, and (d) ganglionic degeneration. Under *Cranial* are given: Morbid processes at the base of the brain, callus following fracture, syphilitic periosteitis, and change of shape and size of foramina through which nerves pass. *Extra-cranial* or *Peripheral*: (a) Dental caries, diseases of pulps, pericementitis, dento-alveolar abscesses, or alveolar affections; (b) tumors or exostosis of roots, causing pressure on the nerves at the exit; (c) secretions in the accessory sinuses; (d) diseases of the eye, ear, nose, and throat; (e) pressure on nerves caused by cicatrices, impacted foreign bodies, malposed or unerupted teeth, spiculæ of bone, and (f) traumatism.

If the importance of a disease were estimated according to its tendency to a fatal termination, *tic-douloureux* would not be entitled to much consideration: but it demands the highest degree of attention, if the distressing character of its symptoms be taken into consideration.

The sufferings which frequently attend this dreadful malady cannot be exceeded, debarring the unfortunate patient from the pursuit of either business or pleasure. When he seeks relief by mingling in society, he is constantly exposed to conditions which excite the return of his torture, eventually dooming him to a life of seclusion, and occurring generally at an age when hope and enterprise are the natural characteristics. The mystery of pain presses upon our life on every side. It presses upon us in all our work, in every branch, but nowhere in such pure intensity and penetrating character does it tap our energy and baffle our resources as in that expression which is called the disease of pain, *i.e.*, neuralgia.

The part which pain plays in life is varied, but we should be, on the whole, thankful for it. Pain is essentially a warning of that which is worse than the pain itself. It is a warning which excites escape from the coming evil, of which it is the shadow thrown before. Without pain, without that which is incongruous, unpleasant in various degrees, from the slightest discord to intensity of agony, there could be no adequate escape from that which is injurious. It is the most advanced post; it is the listening station nearest the trenches. There is, however, a pain produced the intensity of which becomes paramount over any disease, and thought of all other afflictions is veiled, the individual becoming an abject slave to the pain itself. When this stage is once reached, any relief, regardless of the risk to life, is demanded, and not infrequently the afflicted one seeks relief by self-destruction.

#### SYMPTOMS.

Neuralgia well marked can scarcely be mistaken. Its leading and distinguishing characteristics are a peculiar pain aptly expressed by the term *tic*, consisting of successive shocks darting along a nerve or nerves; it is seldom or never attended by swelling or any apparent inflammation, the paroxysms return periodically, sometimes as regularly as intermittent neuralgia in their several

types. This, however, applies more to the disease in its acute form and especially that affecting the facial nerves. Located elsewhere, or becoming chronic, it is less clearly designated, though under all circumstances it is so retentive of some of its own features as to be recognized with little hesitation or perplexity.

Neuritis, especially of the nerves of the teeth, occasioning what is called "tooth-ache," bears the closest analogy to *tic-douloureux*. *Tic* may, however, be distinguished from ordinary and genuine *odontalgia* by the character of the pain, the pain in the dental affection being deep-seated, more obtuse and permanently enduring, ultimately followed by swelling of the cheeks or gums, often ending in suppuration, or other effects of the inflammatory process.

In the early prodromal symptoms of neuralgia, which gradually lead to that type known as *tic-douloureux* or affection of the trifacial nerves along their lines of distribution, the pain may be, and usually is, most insidious in its onset. It is a disease of long standing, whose origin is vague and the sensations of unrest fleeting. The sufferer may have dim recollections of having endured some momentary distress years previously, to which no attention was given. As the process gradually reaches the epileptic form, the type designated as *tic-douloureux* takes on special and characteristic phases which cannot be mistaken. This form of the disease may come on suddenly and without premonition. The pain is the principal symptom. It frequently is preceded by some general disturbance, especially of the stomach and collateral organs amounting occasionally to confirmed dyspepsia. There may be the so-called "aura." As immediately precursory of an actual aggression in this shape, some sense of chilliness, gastric disorder and pallor of the skin, are often to be noticed, or without such marked affections, a general uneasiness is experienced. Not infrequently there may be a thrill or creeping sensation, like formications, or the *aura epileptica*, passing rapidly in the direction of the nerve. In many cases preliminary indi-



cations are wanting and the paroxysm is ushered in by an ache in the part, soon aggravated to intense poignant darting pain from the incipient point, along the nerve and its distributions. The direction of the pain is influenced by the course of the nerve affected. If it is situated in the superior maxillary branch, the pain will probably radiate over the cheek-bone, beneath the eye, the alæ of the nose, upper lip, gums and teeth. If displayed in the forehead, temple, inner canthus of the eye or the globe itself, the ophthalmic branch of the fifth is affected. When the nerves running to the lacrimal glands are involved, there may be a profusion of tears.

Manifestations of pain along the mandible or tongue would indicate the third branch. The character of the pain has aptly been designated as lancinating, sharp, stinging, intermittent, epileptiform, increasing in violence until a climax has been reached, when it may abruptly subside only to reoccur after a short duration of rest, or it may remain dormant until a future stated period. The periodicity of these attacks is quite noticeable. Usually starting at some regular time of the day or night it may appear every 12 or 24 hours, similar to the attacks of malaria. During the interim the sufferer sits with bated breath and apprehensive of the renewal of his torture. The slightest motion, such as masticating, drinking, talking, stroking the face, a draft of air, noise or even combing the hair, may bring on an attack. The pupil of the eye on the affected side may be slightly contracted; conjunctivitis, photophobia and flushed skin are a few of the constant manifestations noticeable.

A condition which I have frequently observed is that of a fairly well-marked gingivitis on the involved side *only*, while the gums and teeth on the unaffected side were perfectly normal. Not infrequently the hair turns gray in patches on the involved side, and this is especially true in cases of long standing. The skin may be hyperæsthetic or anæsthetic; it may become dry and wrinkled. The face is sometimes drawn slightly

to the affected side, secretions inhibited or there may be an increased flow of saliva, taste perverted, and hearing dulled.

Occasionally, there is spasm, or at least twitchings or vacillations of the adjacent or remote muscles. The duration of the attack is very indefinite, lasting from one to two hours to several days, and its recurrence or exacerbation is alike in the day and night. Passing off by gradual abatement, it leaves the part for some time afterward either very tender or moderately sore, but without any further suffering or inconvenience.

#### DIAGNOSIS.

An error in the diagnosis of a well-advanced case of tic-douloureux is very rare, although mistakes have been made, occasioning unnecessary operations and quite frequently the loss of many unoffending teeth.

The history and the characteristic spasms of pain, together with tenderness elicited by pressure on the points douloureux, are exceedingly valuable.

For the ophthalmic division pressure is made by the tips of the fingers over the supra-orbital foramen. The supra-maxillary branch shows painful points at the exit of the nerve at the infra-orbital opening, while mandibular tenderness may be provoked by pressure over the inferior dental, or mental, foramen.

It is well to remember that tenderness is not always clearly manifested and usually is but relative. Pressure must be made over the douloureux points on both sides of the face and a comparison noted. Almost invariably tenderness will be increased on the involved side. The absence of sensitiveness over these areas does not exclude, nor does its presence always confirm the diagnosis of tic. All other available symptoms should be compiled before a decision is justified.

Conditions which might be confused with tic-douloureux are brain tumor and headaches occurring from syphilis. The symptoms of the former would of course depend on its location and this may facilitate a differential diagnosis. A



small tumor, however, in the cerebellar-pontile angle may cause much doubt. Gummas are usually susceptible to specific treatment. Syphilitic headaches seldom, if ever, reach an epileptiform stage. They are apt to be migratory, the pain low-grade, dull and constant, and almost invariably there are or have been other associate symptoms which have isolated the condition. Ophthalmic causes are usually detected by the specialist in that field. Migraine is to be thought of as it is a complex sensory neurosis characterized by pain in different locations of the cranium; *i.e.*, occipital, vertex, frontal, or temporal. There is, however, a marked difference in the character of the pain, and conditions which cause exacerbations of tic do not influence that of migraine. Almost all the distress arising from the latter apparently exists within the cranium.

#### TREATMENT.

The treatment, so far as any hopeful results are concerned, is surgical. There are various methods suggested, each having its favorable features. It is not necessary to go into any tiresome, minute description of any one, but only to speak in a general manner relative to the subject.

The procedures from a surgical standpoint may be divided or classified into extra-cranial, intra-cranial, and the injection of the various foramina and ganglia with alcohol or other aqueous preparations. The ease with which the injection is executed and the simplicity of the technique, especially in the peripheral exits, strongly tempt the surgeon to resort to this manner of alleviating the pain of the sufferer. On account of its being quite devoid of danger and occasioning but little pain, it is never difficult to persuade the patient to submit.

The careful avulsion of the nerve is probably the most satisfactory treatment. When slowly done, great lengths of the nerve may be secured successfully. The duration of the subsidence of the pain depends altogether on the amount of nerve structure removed. In the twist-

ing of the hemostat with which the nerve is grasped, great care should be exercised to prevent the sharp and serrated edges of the instrument from cutting through the structure, thus allowing the distal portion to slip back into its bony canal from which place it is impossible to again grasp it, unless further surgical intervention is instituted. Many of what might have been pleasing results have been marred by too much haste. There is no fixed rule to be followed relative to the extirpation of the nerve. It has been suggested that one turn a minute on the hemostat would be quite rapid enough.

With many operators who have practiced this method frequently, there comes an unexplainable sensation, laden with information, which is transmitted to your hand by the character of the resistance of the nerve. Those who have in their boyhood days pulled angle-worms from the ground will recall with what skill they applied the tension on the resisting worm, in order that they might claim him unbroken.

This same skill could well be applied to the removal of nerves by avulsion.

Neurotomy, neurectomy and nerve stretching all give varying periods of relief, but avulsion usually gives most satisfying results for periods varying from one to four years and a few of the writer's cases have gone much longer without recurrence. As a rule you again hear of the case after the expiration of a couple of years. I have on record very many cases where the relief has been apparently permanent. A few can still be traced after eight years without the return of any pain. The infra-orbital branch of the superior maxillary of the trifacial is the one most frequently attacked. It may be reached by two routes: by making a transverse incision about an inch long through the cheek over the exit of the nerve, using a curved hook in lifting the structure, preparatory to grasping the nerve obliquely with the forceps, and starting to rotate. The principal objection to this method is the scar left on the face. Another and more desirable procedure is to make an

incision about an inch long at the reflection of the mucous membrane of the lip with the gum, just above the superior bicuspid, or in that location if the teeth are missing, and raising the soft coverings from the bone up to the nerve exit. The periosteum is then incised and elevated, when the hook is again used and the nerve pulled down within reach of the grasp of the forceps.

The objection to this latter method is that the operator cannot get so favorable a view of his field; and also the inflammatory reaction will be more pronounced. The scar, however, is not present, and that means much, especially with women.

Division of the sensory root as it leaves the ganglion of Gasser has met with pleasing success and is the surgical choice when the operations upon the peripheral branches have failed, or where the malady arises through ganglionic degeneration or other intra-cranial causes. Removal of the Gasserian ganglion, through modern surgery, has been stripped of much of its dangers. It has been the custom of both medical and dental practitioners to delay giving their consent until a condition was reached by the patient where death had lost its sting, and any hope of relief from their tortures was willingly accepted, irrespective of the accompanying dangers.

As a result of these deductions much unnecessary suffering was endured, and the patient was eventually brought to the table in a most depleted state, materially reducing the anticipated good results. Years ago the mortality following the extirpation of the Gasserian ganglion was claimed to be about twenty-two per cent. Frazier claims a mortality at the present of only five per cent. Taking into consideration the advanced age of most of the patients who are operated upon for this condition, the gravity of the attempt fades and cannot be considered with much greater apprehension than surgical risks in general.

Some of the possible after-effects accruing from the removal of the ganglion of Gasser are paralysis, aphasia, cutaneous anesthesia, hypoglossal palsy,

ocular complications, keratitis, corneal ulcerations, etc. These untoward results, however, are comparatively rare.

Alcohol injections into the nerves as they make their exits from their different foramina are usually followed with but fleeting results, especially when injected into the supra-orbital, infra-orbital or mental foramina, as compared to the deeper injections at the foramina ovale or rotundum, which prove more lasting and satisfactory. The technique has been so generally exploited of late years that it is unnecessary to again give it in detail. Injection into the Gasserian ganglion has met with many advocates and a few surprisingly pleasing cures have been obtained. The practice, however, is of too recent origin to enable one to give any just opinion. About the same results are claimed for it that would accrue from the total extirpation of the large ganglion itself. Some of the undesirable sequelæ, however, have been reported, such as palsy, corneal ulceration, etc. The commendable features of this method are that it greatly reduces the risk to life, in fact, the mortality is almost *nil*; there is no hemorrhage, nor is the operation accomplished with any great surgical shock. In experienced hands it is easily executed, and for this reason alone patients are more susceptible to persuasion than they would be if confronted with the danger of the intra-cranial surgical route.

In conclusion, I shall cite three cases which may be of interest to dentists, two occurring in my own practice and one reported by Weisenburg.

The last-named case should be a warning to us, not to concentrate too intently on dental conditions as the only cause of the malady known as *tic-douloureux*. The one of Dr. Weisenburg's was when a cerebellar-pontile tumor had given symptoms similar to, and had been treated six years for, *tic-douloureux*.

#### CASE REPORTS.

Man, age thirty-five, negative family and personal history, in 1903 first begun to have pain in the upper teeth on the right side, for which he consulted a dentist. Even-



tually all the teeth in the right upper jaw were removed without any results. Five peripheral operations were performed but with no relief. Four years later the characteristic douloureux symptoms became so intense that the inferior dental branch was removed. Later an attempt to remove the Gasserian ganglion was made. This was done in two stages. The ganglion was exposed and the third division cut. At a still later operation the ganglion was removed and the patient made a good recovery. The pain while assuaged was still present and remained for two years, when, in 1909, he again entered the hospital and had his eye on the affected side enucleated on account of the corneal ulceration; at this time other teeth were extracted. About a year following the removal of the ganglion, the pain became worse than ever before. Alcohol was injected almost daily to give temporary relief. This was kept up until his death, about 1911.

The autopsy revealed a tumor in the right cerebellar-pontile angle, lying directly on the sensory and motor root of the fifth nerve.

Another case worthy of mention which occurred in my own practice was that of Mrs. R—, age forty-five, referred by Dr. Robinson, a practicing dentist of this city. Twelve years previously this lady noticed some discomfort in the region of the upper right bicuspid. The second bicuspid was missing and the six-year molar was situated directly against the first bicuspid. Her dentist filled a small cavity in the superior right molar which seemed to be the only apparent cause of trouble on that side of the mouth. Her weight at this time was about 140 pounds. The dental service did not seem to assuage her trouble; in fact, the pain increased. Later the same tooth was devitalized and again properly treated and filled, without any apparent improvement of the pain.

The following two years she was under the observation of her family physician, who was inclined to think the patient was undergoing a marked nervous reaction due to the establishment of her menopause. The pain grew gradually worse until her condition became deplorable. Symptoms characteristic of tie-douloureux were now well established, and the intervals between the paroxysms would average about half an hour. The slightest irritation, such as draft of air, pressure on the lips, or an attempt to smile would occasion the most excruciating agony. It was quite impossible for her to masticate her food and her weight was now below 100 pounds.

The molar tooth, which had first attracted attention, but during the past few years had been somewhat forgotten, was now extracted with almost immediate relief. This, however, was transitory, as the former trouble became quite as acute as ever.

Twelve years from the onset of her symptoms she moved to this city, when her dentist, Dr. Robinson, suggested an X-ray, with the result that the picture revealed an unerupted second bicuspid tooth diagonally placed in the alveolar process, the root slightly elevating the mucous membrane in the floor of the antrum, and the cusp having eroded its way into the root of the first bicuspid was pressing directly against the rear of that tooth, thereby causing constant irritation to the nerve. The unerupted tooth, together with the first bicuspid, was removed with the most gratifying results. Two weeks of absolute freedom from pain followed, when once again the same old distress occurred with renewed violence. A careful avulsion of the infra-orbital nerve was now done and the patient remained comfortable for a period of about two years. Her weight rapidly increased to about 150 pounds, her health remained good. Occasionally at the present time (four years later) there are beginning slight "twinges," which are well controlled by deep injections of alcohol into the large foramen at the base of the skull.

The third case is somewhat different from the two preceding and may be of interest. Mrs. G—, age thirty-three. Family history negative. She had measles and chicken-pox at the age of six and eight years respectively and typhoid fever at eleven years. She has given birth to four children and has had two miscarriages. Fifteen years ago the patient experienced frontal headaches and pain radiating down the neck to the left shoulder and axilla. The pain, which at first was mild, later became of a darting character and quite unbearable. Ten years ago she was subjected to an abdominal operation and her right ovary was removed. Six months afterward her left ovary was also removed. The pain in her face reached the epileptiform type about one year ago. November 10, 1919, she presented herself to me for this facial condition. The supra- and infra-orbital, together with the mandibular branches, were removed. The facial distress immediately subsided and at the present time, one month after operation, her general condition is very much improved.

130 S. 18TH ST.



## A Practicable Root-canal Technique.

### VI: Bacteriology.

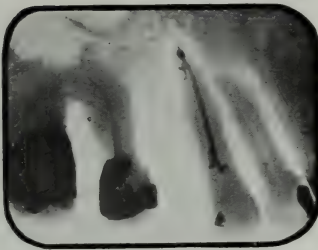
By ARTHUR B. CRANE, D.D.S., Washington, D. C.

(Continued from page 342.)

THE leaders of the medical profession are waiting with open minds for conclusive evidence that periapical infection can be eliminated by root-canal treatment. Meanwhile, know-

crease the malady that all chances of recovery are lost. This method is further controvertible on the ground that evidence exists that new bone growth may occur in the presence of dangerous infec-

FIG. 1.



A



B

Radiographic check reasonably convincing.

ing full well that extraction and curettage will be followed by a healthy condition of the tissues, it is small wonder that many physicians are demanding such treatment for all infected teeth. This attitude will continue and increase until some tangible method of proving the effectiveness of root-canal therapy is available.

The present dependence upon radiographic check, while reasonably convincing in some cases (Fig. 1), requires from three to six months for demonstration. In cases attended by serious metastatic lesions this interval may be sufficient, if periapical infection persists, to so in-

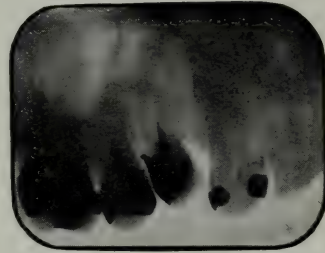
tion. This may be observed where new bone fills in the area once occupied by an absorbed root (Fig. 2), or the formation of new bone in the alveolus over a root tip left in by fracture during extraction (Fig. 3). Even eliminating these objections, the check-up method is ineffectual because of the disinclination of dentists and patients alike to make use of it. Hence if we are to have a method of proving the elimination of periapical infection which will be universally valuable, it must be capable of exhibition prior to filling the root canal.

The time has come to give pre-eminence to this requirement. Until the

sterility of the tissues can be reduced to demonstration the filling of root canals remains an empirical procedure, worthy of the condemnation it is receiving in many quarters.

tific value is lessened by the possibilities of contamination. The other plan is to gather on the tip of an apexographer or platinum broach some of the periapical content by passing the instrument

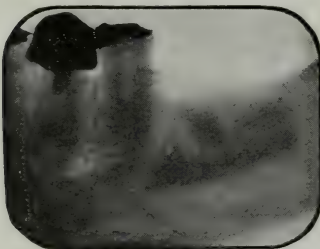
FIG. 2.



New bone growth in presence of streptococcus infection filling-in area once occupied by resorbed root apex.

A study of culture methods and culture media is the foundation upon which must be built any attempt to predetermine the successful outcome of root-canal therapy.

FIG. 3.



New bone growth in presence of infected root apex left in by incomplete extraction. Note radiolucent area surrounding fragment.

#### CULTURE METHODS FOR DETERMINING STERILITY OF APICAL TISSUES.

The first difficulty to present is that of obtaining reliable material for the culture. Two methods are in vogue. One consists in aspirating some of the periapical fluids through the root canal. This method is difficult and its scien-

tific value is lessened by the possibilities of contamination. The other plan is to gather on the tip of an apexographer or platinum broach some of the periapical content by passing the instrument through the canal. This method also is open to scientific objection in that the material is gathered in a direct line with the canal where the greatest force of antiseptic treatment is expended, while the little crypts surrounding the area of disturbance are the points most liable to remain infected, and these cannot be reached by this method. The finding of a negative culture may thus only mean that the material has been gathered from a part of the field temporarily under the influence of antiseptics. Another possibility is that some of the antiseptic used in treatment may remain in the canal and be carried over into the culture tube and inhibit growth. The finding of a positive culture may be the result of contamination.

For about three years now the writer has taken cultures prior to filling the canal in practically every tooth treated. Until recently the technique of obtaining the material for culture was as follows: The canal was dried as thoroughly as possible with sterile cotton points to absorb any excess of antiseptic present. A sterile apexographer was then passed through the apical opening until pain was experienced. Upon withdrawal the

instrument was made to scrape the side walls of the canal and then used to inoculate the media.

For the purpose of checking the value of this method the following experiments have been made. In one series of cases sterile cotton points were immersed in a sterile 25 per cent. solution of glycerin and sealed into the canal with gutta-percha, rendered sterile in the flame. These were left in place for four days or longer, dependence being placed upon the hygroscopic action of the glycerin to induce osmosis and thus draw into the cotton the fluids of the periapical region. At the following sitting the cotton points were removed and dropped into culture tubes. Immediately thereafter cultures were made with the apexographer as described. In another series of cases similar experiments were performed with cotton points saturated with glucose broth, thus furnishing a rich pabulum for the propagation of any vital bacteria present. There was nothing in the results from either of these series to indicate any advantage of the cotton points over the apexographer.

More recently a third series of cases has been tried as follows: A culture was first taken by the apexographer method. This was followed by aspirating some of the periapical fluid into the canal, when a second culture was made by the apexographer method. The aspirating needle was roughly made by soldering a cupped disk of 30-gage platinum plate about three-eighths of an inch from the end of the platinum point of a Berlin abscess syringe, in such a manner that it would act as a platform upon which to carry temporary stopping to automatically seal the cavity when the syringe point was introduced into the canal. When the temporary stopping has hardened the syringe point is connected to the Elgin casting machine by means of rubber tubing and about twelve pounds negative pressure used. The needle is then withdrawn and most of the temporary stopping comes away with it. If the apexographer is now passed through the periapical fluid which has been drawn into the canal, and on through the apical

opening until pain is exhibited a most reliable culture will be obtained. Based upon twenty cases in which comparative tests were made, this method is somewhat more efficient than the simple apexographer method.

While it is possible that some more certain method of taking the culture may be developed, with such an easy means at our command, there is no present justification for an empirical acceptance of unreliable clinical evidence in determining when the canal is ready for filling. Even though the finding of a negative result by this method is not absolute evidence of sterility, the finding of a gram-positive coccus is a sure indication that sterilization has not been accomplished, and by this guide alone we shall be prevented from filling the canals of many teeth which would otherwise seem to justify that procedure. For those who have not taken the routine precaution of making cultures prior to root-canal filling a surprise is in store, for positive growths will be recovered from about 30 per cent. of all cases which give every clinical indication of successful termination of the treatment.

#### SELECTION OF CULTURE MEDIA.

Next in difficulty only to obtaining the culture is the selection of a practicable culture media. In the overwhelming majority of cases we have to deal with the streptococcus and some media especially acceptable to its growth must be selected.

At the beginning I used an ordinary agar slant. This was inoculated with a stab and smear, the idea being to culture both the aerobic and anaerobic organisms. Growth developed very slowly in these tubes and too large a number remained negative. This led to the opinion that sufficient of the antiseptic used in canal treatments must be carried over with the culture material to cause inhibition. It was, therefore, decided to use a liquid culture media and in such volume as to dilute this inadvertent antiseptic to a neutral state.

Glucose broth was tried, but the large



percentage of negative results made us suspicious of its efficiency. Besredka's egg broth was then employed, and duplicate cultures were made for comparison with glucose broth. These experiments proved our suspicions to be well founded and the use of glucose broth was discontinued. Later the trial of glucose broth enriched with human ascitic fluid was suggested. We had considerable difficulty in obtaining and keeping this medium in a sterile condition and comparative cultures did not demonstrate any superiority over the egg broth.

After using the egg broth for some months, however, there was still a feeling of uncertainty, caused by occasional cases in which the clinical symptoms were at variance with the finding of a negative culture. Dr. Le Comte to whose co-operation in the laboratory is due much of the credit for anything of value that may be presented here in this connection, then suggested the following medium which is by far the most satisfactory we have yet used:

1. Human blood dried at 56° C. Pulverize to fine powder in mortar. Make solution in distilled water so that it equals 100 per cent. hemoglobin (Haessler-Felton Scale made by Hynson, Westcott & Dunning). Heat at 100° C. in Arnold sterilizer; filter clear.

2. Double strength "Difco" nutrient broth.

3. Mix equal parts of Nos. 1 and 2, tube, and sterilize by fractional method.

Each batch is tested before use with several strains of streptococci to determine its potency. Then when the new batch is used duplicate cultures are made in a few cases to determine its relative

sensitiveness. It is necessary to stain material from the tube in order to determine the presence or absence of bacteria. Any bacteria found, other than Gram positive cocci, are considered contaminants and another culture made before pronouncing a result. Occasionally a culture is made from an undoubted area of active infection as a check upon the technique.

The length of time allowed for incubation before pronouncing a negative result is also of great importance. With the agar slant we had many cases which remained negative until the tenth day. With the ascitic fluid medium we had one case which developed growth on the thirteenth day. With the egg medium we had one tube develop growth on the eighth day and one on the ninth. With the blood medium there has as yet been no case in which growth has begun after the fourth day, so that is now being used as the minimum time for culture.

The making of cultures in every case prior to filling the canal is not expected to appeal to those who blindly attempt to save all infected teeth, nor to those who advise extraction in every case. Fortunately for the conservative dentist there lies a mid-course in which such precaution will lead toward success.

In addition to the streptococcus, which is most frequently found, the staphylococcus and diplococcus are also often encountered. It is well for the dentist to learn to recognize the organisms with which he must deal and a careful study of a modern textbook on bacteriology is recommended.

921 15TH ST., N. W.

(To be continued.)

## Mouth Hygiene, Controlled by Diet Through Salivary Analysis.

By H. C. FERRIS, D.D.S., New York, N. Y.

(Read before the New Jersey State Dental Society, Atlantic City, July 17, 1919.)

NINE-TENTHS of the population of the United States are suffering from caries of the teeth, and fifty thousand dental specialists are endeavoring to combat this disease. What are they accomplishing?

For centuries the best men of our profession have been devoting their energies to the perfection of their artistic and mechanical skill in repairing lost tooth structure by artificial restoration. Our American dentists have given the world a new standard of unimpeachable workmanship, and as a direct result they are lengthening the lives of thousands of our population by restoring their masticatory power. The results of such a work are in no way to be underestimated, but we propose to go further and state the question thus: Does the obligation of the dental profession cease with what is at best a temporary handling of caries of the teeth?

A small percentage of dental specialists are endeavoring to prevent and check the ravages of caries by instituting prophylactic methods and hygienic care of the mouth by systematic polishing of the teeth with toothbrush and dentifrices of varied chemical properties. This is merely a means of assisting nature where she has failed physiologically to protect these parts. "Clean teeth never decay" is a statement that is not wholly true; but we are amply justified in teaching this doctrine of cleanliness to the general public, for in spite of the fact that a clean mouth *is not* a caries-proof mouth, it *is* one in which we are assisting nature

in her normal effort to overcome the abnormal and pernicious effects of the average American diet. We must understand and control the environment in which the teeth and the soft parts of the mouth live, if we are to teach real prophylaxis for the oral cavity. We are not born with toothbrushes in our hands, but as a nation we are driven to the use of them as a primary safeguard for the teeth, even though by so doing we tacitly acknowledge that there is a basic fault in our habits of life.

However, our first duty as dental specialists lies in the broader field of physiology, for we are dealing with conditions that are not purely local but general. Since tooth structure, the most highly organized tissue of the body, is so easily attacked and destroyed, it is reasonable to conclude that other organs composed of less resisting structures are at the same time suffering their toll of damage and destruction.

I do not purpose discussing in this paper the percentage of those cases traceable to the pathological conditions we have outlined, but I do wish to point out the fact that we fail in the vast majority of our efforts to accomplish a cure of caries with the methods we are employing. The greater part of our profession base their work on the false premise that caries of the teeth is the *primary* lesion, erosion and very many maladies of the body following in its train; whereas your essayist maintains that caries of the teeth is a secondary lesion, traceable to a primary deep-seated patho-

logical origin in the majority of the cases studied.

#### DENTAL CARIES A SECONDARY LESION.

For the sake of discussion let us assume that dental decay is a secondary lesion, or a symptom complex of a pathological condition in some other region of the body, and by a correction of these conditions we could prevent dental caries and other diseases of the mouth. Could we select any better corrective means than the chemistry of our food to bring about this change in the system? Or if we acknowledge that the primary factor originates in the mouth in the form of lost structures or perverted function, we must still admit that the pathological results are far-reaching and general in their influence. This is evidenced by the abnormal condition of the salivary secretion which flows over our teeth a good part of every twenty-four hours of the day, and in a pathological patient is devoid of its natural protecting agencies.

If we are correct in this reasoning, we should then enter the field of physiology and pathology, and write prescriptions for diet instead of filling teeth. This prediction seems fanciful, but it is being accomplished.

A cure for caries, the practically universal plague of the human race, is the gauntlet thrown at the feet of the dental profession by the practitioner of medicine. If the medical man refuses to study this region of the body, the obligation rests upon the dentist.

If we assume the responsibility, and we do, our first acknowledgment must be that we are not only treating the first three inches of the alimentary canal, or the digestive tract, but that we have to deal with the fundamental physiological phenomena of life, digestion and assimilation of food, accompanied by their reflex influences upon the salivary, gastric and pancreatic secretions.

It is acknowledged by the most noted physiological specialists that their practical failures in the study of pathological conditions of the alimentary tract are largely due to overspecialization. The

elasticity of the power and control of the human machine has never been solved. The physiologist acknowledges that he must work with the general practitioner to attain the truth.

And what part does the dental profession have in this combination? It must be acknowledged that so far we have done little toward realizing the necessity for our intelligent understanding of the situation and co-operation.

At the present time, pathologists are quantitatively analyzing the feces, and studying the bacteriological conditions, and have discovered that excessive quantities of carbohydrate and proteid residue alike establish a culture medium for the acid-forming bacteria. They are planting in the intestinal tract native flora, as near as it can be produced, to neutralize the toxins which are the product of the acid-forming bacteria. Some acute and chronic cases of auto-intoxication, indicanuria, acidosis, and colitis have been relieved by this method; but this temporary result does not effect a permanent cure.

Does it not appeal to your common sense that this work is upon the wrong end of the alimentary canal; that many of the pathological conditions of the intestines have their origin in loss of function of the organ of mastication and in the first chemical change of our food, and that the crushing machine that nature has devised is the most practical part of the tract in which to begin treatment? The mouth and its parts represent the most powerful organ of the digestive tract; and every incline plane of a tooth is a part of that machine. The intricate nervous mechanism which controls the secretion of this organ which produces three pints of saliva daily, containing animal ferments, receives little or no consideration in the minds of our physiologists and pathologists, although they acknowledge its function.

The salivary secretions, be they normal or pathological, cannot be lightly dismissed or carelessly considered, for they constitute an index not only to the local oral conditions but afford a key to the



physical and even mental condition of the organism.

#### FUNCTION OF THE SALIVA.

The salivary secretion possesses a dual function. Selectively excited from the various glands under the control of an intricate nervous mechanism, a modified saliva is evolved for each kind of food that enters the mouth. Primarily, it operates to reduce carbohydrates and to prepare other foods for further digestion. Secondly, the secretions of the salivary glands operate as inhibitors upon what we designate as our sense of hunger. After our food is digested and enters the blood stream certain principal properties, such as acid salts and solids, are dialyzed through the glands into the oral cavity in such quantities as to control our morbid desire for certain foods provided we do not, through habit, develop abnormal activity.

As the selection of our diet is voluntary, our mental control may jeopardize the true physiological action that nature has given us. For example, a normal physiological function may be illustrated in our consumption of onions. A short time after eating, we taste and smell of them—the odor and chemical properties enter the blood and return to the saliva until our desire for the vegetable is controlled.

This illustration can be duplicated by many others, if we permit the control to act normally and do not deceive our sense of taste with combinations of carbohydrate, proteid and fatty foods. As for instance, when we eat sour strawberries covered with pulverized sugar, the concentrated carbohydrates (sugar) produce a flow of parotid saliva, which is watery and covers the taste of the acid which should normally call for a flow of mucin to neutralize it; and the vegetable acid of the strawberry passes to the stomach without being neutralized. As its next digestive process takes place in the intestinal tract we overtax the ability of the duodenal secretion to neutralize this acid, and as a result we have a pain.

Again, those of us who eat large quantities of salt butter on our bread cover our taste bulbs with oil and sodium chlorid and deaden their reflex action, and we swallow the starch of the bread without its being converted into dextrin by sufficient flow of the parotid saliva. When this product reaches the stomach, the sodium chlorid in the butter tends to increase the hydrochloric acid, though neither of these products requires this chemical to aid their digestion, and we again pass to the intestinal tract a mass of food which is both abnormally acid and productive of acid, and is taxing to the pancreatic secretion. A hundred combinations of food are served on our tables today so camouflaged that our sense of taste is completely deceived and our nerve mechanism is unable to respond normally.

It is not surprising that so many people suffer from intestinal indigestion when we consider the fact that the masses of undigested food in the intestinal tract form a perfect medium for the multiplication of the acid-forming bacteria. The fermentation and putrefaction of these foods result in the formation of toxins, poisoning the blood and tissues, and overtaxing the eliminating organs. Finally the toxins make their way through the salivary glands, as through a safety valve, into the mouth. Their presence in the oral cavity destroys the normality of the secretions of the mouth and permits excessive growth of bacteria, fermentation and acids, after which they pass out through the feces if they are not returned in this vicious cycle.

It is stated by some biologists that the properties of the salivary secretion are so variable that they are of no particular significance in the study of the pathology of the system. This is not true, for a plot drawn for a given subject by following a careful technique in salivary analysis will through long periods carry distinctive curves with variations only in occasional findings as in urinary analysis.

The technique of salivary analysis under which I operate is as follows:

## SALIVARY ANALYSIS TECHNIQUE.

Revised June 1919.

Immediately upon delivery of a resting specimen, at 11.30 A.M. the saliva is well

percentage, 60 cc. per hour, being regarded as normal.

*Specific gravity.* With a pipet, fill the bulb of a Ferris' Modified Saxe hydrometer, using a rolled wisp of absorbent cotton to remove any bubbles of saliva and lower the surface

## SALIVARY ANALYSIS

File No. 1302			
Patient	Mrs. W. T. S.	Doctor	E. C. S.
Date	November 12, 1917.	Hour	11.56 A.M. 11.55 P.M.
Age	34 yrs.	Weight	110 lbs.
		Time of Delivery	10 minutes
History	Acute cough.	Excessively nervous.	Intestinal indigestion. Neurotic
Type.	Reflexes	Abnormally active.	Married, two children. Husband in Army.
Diet	Drinks one glass of water daily. Milk magnesia daily for 4 years. Does not care for carbohydrates, potatoes, etc. Uses Phenalax daily.		
Pathology of Oral Cavity	Gingivitis		
Gum	Recession	Cheeks	Normal
		Lips	Normal
Tongue	Fissured, gray coat	Roof	Normal
		Floor	Normal
No. of Teeth Present	87654321	12345678	0...artificial crowns. ...caries. 1...missing teeth.
	87654321	12345678	
No. of Inclined Planes in Occlusion	PA in molar region (Normal 139) Normal 206		
Classification of Malocclusion	Class 1 (Angle) Lingual occlusion sup. molars, trituration locked.		
Quantity Received	19.5 cc.	Normal	Normal 60 c.c. per hour
Consistency	Watery	Odor	None
		Sp. Gravity	1.005
Centrifuged Sediment 10 c. c.	6/40	Color	White
		Over-standing Fluid	translucent
Total Solids, by Weight	.01	Grams	%
		Ash trace	Grams %
Acid Index to Phenolphthalein	3	To Phenolphthalein and Aldehyde	7
Ammino Acid as Ammonia	.0059	Total Acid	10
Alkalinity to Methyl Orange	9	Ptyalin Index	2.5
Free Cl	2 c.c. .17720 %	Combined Cl	.005
		Urea	1/40
Globulines trace	Mucin	2/40	Dissolved Mucin
		None	Esbach's Albumin
			1/40
Thiocyanates	115,000	Diacetic Acid	None
		Blood	None
Proteolytic Test	4B 7/40	Acetone	None
		Crystals	Dialyzed ECL
Bacteria	No cream		CON. H. HNO
			2 4 5
		Examiner	Dr. Henry C. Ferris
		Assistants	C.D.
Intestinal			
Notes	Bacteriological Index 15%.		

CHART I.—Salivary analysis record from which the plot is drawn.

mixed by pouring several times into another tube. The *quantity* is accurately determined, the *consistency* and *odor* being noted; also the *time of delivery* (in minutes) and the

of the liquid until the meniscus just touches the line. Insert the stopper and immerse the hydrometer in distilled water at 70° F., so that no air bubbles adhere to it, and read the





specific gravity as given on the stem of the hydrometer. Spin the hydrometer and read again to verify first reading. It is well to rinse the hydrometer occasionally with 95 per cent. alcohol. (Normal limits 1.003 to 1.005.)

*Proteolytic test.* Reagent: Dissolve 1 mg. of casein (C. P.) and 1 mg. sodium carbonate in 1 liter of distilled water. Mix one-half cc. of Fehling's copper solution, and 5 cc. Fehling's alkaline solution, and add the mixture to 94 cc. of the first solution. The color will be a light blue.

Heat 5 cc. of the reagent in the thermostat at from 37 to 38° C. for one-half hour. Then add one-half cc. of saliva and watch color. If there is a strong reaction, the color will become pink in 5 seconds, indicating the presence of peptone. If the reaction is medium, a lavender color will result, indicating albumin. If there is no reaction, the color will remain a dirty blue, and will indicate unsplit casein.

*Ptyalin index.* Make 2 per cent. starch solution: 38 grains starch, 120 cc. distilled water. Dissolve the starch in a little cold water and add gradually to the boiling water and boil 5 minutes. When cold add 2 drops oil of peppermint.

To 9 cc. of 2 per cent. starch solution add 1 cc. of saliva. Shake well and heat in the thermostat at from 37 to 38° C. for one-half hour.

10 cc. of Fehling's solution are diluted with 20 cc. of distilled water and treated with 4 cc. of a 0.05 per cent. solution of potassium ferrocyanid. While boiling, the incubated starch salivary mixture is added drop by drop until the blue color entirely disappears.

Select pipet, dropping 20 minims to 1 cc. of saliva, and the following table will assist in determining the index:

Minims.	Index.	Minims.	Index.
2	50	11	9
3	33	12	8.3
4	25	13	7.7
5	20	14	7.1
6	16.6	15	6.6
7	14.2	16	6.2
8	12.5	17	5.8
9	11.1	18	5.5
10	10	19	5.2
		20	5

Fehling's solution is prepared of such strength that the copper contained in 10 cc. is completely reduced by 0.05 gram of glucose. If the saliva is carefully added to this quantity until complete reduction takes place, the amount of sugar contained in a given speci-

men of saliva can be readily calculated according to the following equation:

$$Y : 0.05 :: 100 : X, \text{ and } X = \frac{5}{Y}$$

in which Y indicates the number of cubic centimeters of saliva required to reduce the 10 cc. of Fehling's solution and X the amount of sugar contained in 100 cc. of saliva. (Simon, modified.)

*Acidity and Organic Matter in Amino-acids recorded as Ammonia.* Add 1 drop of neutralized 1 per cent. solution of phenolphthalein in alcohol to 2.5 cc. of saliva, and titrate with N/40 NaOH solution to a permanent color of faintest pink. Ten times the number of cubic centimeters of NaOH used gives the acid index. Since N/40 : N :: 2.5 cc. : 100 cc., and the acidity is expressed in parts per liter (1000 cc.).

*Combined Acids.* Add to the above, 1 cc. of neutralized formalin. The pink color disappears because the formalin splits ammonia from the organic matter, liberating free acids. Titrate again to find the amount of combined acids thus liberated, and multiply the reading by 10 as before.

*Total Acidity.* Total acidity is obtained by adding the two findings. Amino-acids calculated as ammonia may be obtained by multiplying the second finding by 0.0017.

*Alkalinity.* To 2.5 cc. of saliva add 1 drop of methyl orange solution, and titrate with N/40 HCl solution to a permanent color of rose. Ten times the number of cubic centimeters of HCl used gives the alkalinity index.

*Free Chlorin.* To the 2.5 cc. of the specimen used for determining of acidity, add 10 cc. of chlorin-free distilled water and 8 drops of a 5 per cent. solution of potassium chromate, then titrate with N/40 silver nitrate solution, until the first appearance of a permanent reddish tinge. Multiply the number of cubic centimeters of silver nitrate used by 0.0886 to find the amount of chlorin. (Recorded in 1/10 on plot.)

*Urea.* Reagent: Sodium hypobromite containing an excess of sodium hydrate. To this end 70 cc. sodium hydrate solution are diluted with 180 cc. of water and treated with 5 cc. of bromin (Dr. Chas. Rice's formula) in a bottle provided with a ground-glass stopper, the mixture being thoroughly shaken until every trace of free bromin has disappeared. The sodium hypobromite solution, if kept in a perfectly dark and cool place, may be preserved for a week or two, but the proportions may be divided by 10, thus making only enough reagent for the day's test.

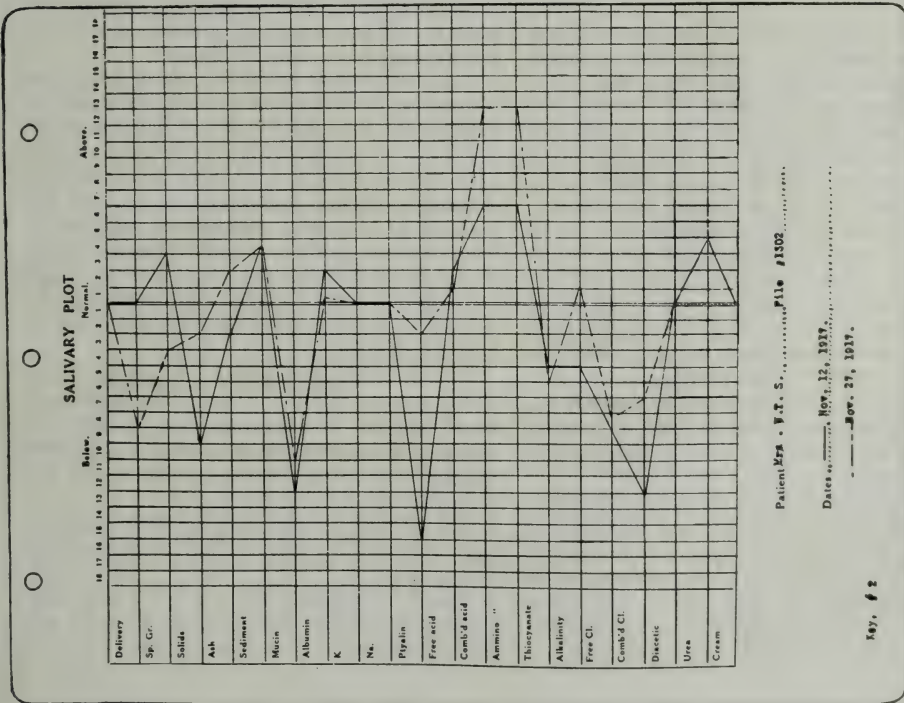


CHART IV.—Shows two plots—one before and one after treatment. This patient was cured of a chronic cough, excessive nervousness, and intestinal indigestion, and gained 15 lb. in four months.

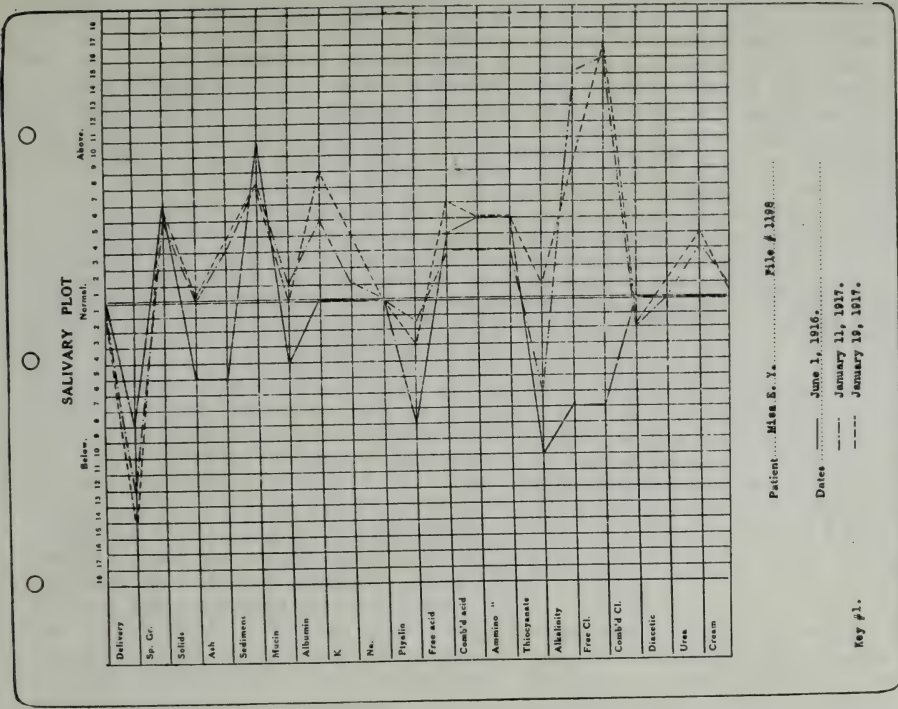


CHART V.—A plot representing three examinations of a child twelve years of age, who was undergoing an orthodontic operation, which acted as a stimulus to the secretions, but was not under dietetic treatment. You will note improvement in her ptyalin, thiocyanates, solids and mucin findings, but many of the other readings are markedly pathological.



Fill the tube of a Ferris' modified Doremus ureometer with a saturated NaCl solution. While the stop-cock is closed, the tube is inverted, the stop-cock is opened for a moment and again closed, so as to fill its lumen. Add 1 cc. saliva to the upper tube. Allow this to run through the stopper carefully, then close, and add 1 cc. of the reagent. When this has gone through, close the stopper quickly, set up the apparatus, and allow to stand one hour or longer. Then by gently tapping, cause any bubbles adhering to the sides of the tube to rise to the top and read the amount of gas collected. Each division represents 1/40 cc. of nitrogen. It has been found, however, that only 354.3 cc. of nitrogen are evolved from 1 gram of urea at best when this hypobromite method is employed.

Knowing that 354.3 cc. of nitrogen corresponds to 1 gram of urea, the amount of urea to which the volume of nitrogen actually observed is referable would then be found according to the equation

$$1 : 354.3 :: X : Y, \text{ and } X = \frac{Y}{354.3}$$

in which Y denotes the number of cubic centimeters of nitrogen evolved from 2 cc. of specimen and X = the corresponding amount of urea. In order to obtain the percentage in 1 cc. this figure is divided by 2 and multiplied by 100 (Simon). This is recorded in 1/40 for brevity.

*Diacetic acid (Arnold & Liplowsky Reaction).* Reagents: (a) a 1 per cent. solution of potassium nitrate. (b) To 1 mg. para-amidoacetophenone dissolved in 1 cc. of distilled water, add about 2 cc. concentrated hydrochloric acid, drop by drop, until the solution becomes colorless. Just before using, mix one part of (a) with two parts (b).

Add 1 cc. of the mixed reagent to 1 cc. of saliva, and add 1 or 2 drops of concentrated ammonia. A brick-red color results.

To this solution add from 10 to 20 cc. of HCl (sp. gr. 1.19), 3 cc. of chloroform, and from 2 to 4 drops of ferric chlorid, and carefully mix without much shaking.

If diacetic acid or indican is present the chloroform becomes violet or blue; if absent, yellow or red (clear). This test detects 1 in 25,000 parts of the acid.

*Thiocyanates.* Use colorimetric scale (Ferris-Schradieck). 1 cc. of the specimen in tube A, 1 cc. of 1:2,000 ammonia sulfocyanate in tube B; add 2 drops of 5 per cent. ferric chlorid solution to each tube; add aqua destillata in tube B until its color matches that of the specimen. Read the scale in

thousandths and ten-thousandths, the percentage being determined by dividing 100 by the reading.

*Precipitates.* I. Centrifuge 10 cc. of the specimen of the saliva for three minutes in a tube graduated to 40ths. Record the amount, percentage and color of the sediment. Pour off and save the supernatant fluid; record its appearance.

II. To the precipitate add 10 cc. of lime-water. Shake vigorously and let stand for five minutes. Shake again and centrifuge. The difference between the total sediment and this reading gives the amount of mucin and nuclear albumin. Record the percentage of the mucin in the sediment.

III. To 2 cc. of the fluid saved from "I" add 8 cc. distilled water. A cloudy appearance indicates the presence of globulin. Centrifuge, and record the amount.

IV. (a) To the fluid remaining from "II" add 10 drops of glacial acetic acid. A precipitate indicates dissolved mucin. Centrifuge, and record the amount and percentage of mucin. Repeat as a control, using the remaining 6 cc. of supernatant fluid from "I" diluted with distilled water to 10 cc., and compute the dissolved mucin and Esbach's albumin for 10 cc. (Recorded in 40ths.)

(b) If the saliva is thin, and if it gives only a trace of dissolved mucin which settles easily, repeat, using the whole of the liquid remaining from "I." Save the liquid, and subtract the amount of globulin from the percentage of precipitated mucin.

(c) If the saliva is viscid, and if it becomes cloudy in "a" without the separation of a precipitate, take 2.5 cc. of the liquid remaining from "I," add 7.5 cc. neutralized 95 per cent. alcohol, shake well, and let stand for 5 minutes. Then centrifuge, and record the amount of dissolved proteids in the saliva. Pour off and save the liquid. Then add lime-water to the precipitate, shake well, let stand for two or three hours, and centrifuge to determine the amount of mucin dissolved from this precipitate.

V. (a) To the liquid remaining from "IV (a)" or "IV (b)" add 1 cc. of 10 per cent. solution of potassium ferrocyanid. If albumin is present the specimen will become cloudy. Centrifuge as before, and record the quantity of albumin.

(b) To the liquid remaining from "IV (c)" add 1 cc. nitric acid to see if there be a precipitate.

Also to the liquid in "IV (a)," when the precipitate will not settle, add 1 cc. of 10 per cent. solution of potassium ferrocyanid, and



Name... Miss C. B.

January 6, 1917.

File # 1216

## Case History.

Female.. 12 years of age.      Weight.. 85 lbs.      Height.. 5 ft. 2 in.  
 Good family.      Father.. Physician.  
 Scarlet fever year previous. Abscess in deep cervical gland.  
 Persistent running sore on leg. Negative Wassermann  
 Anemic. Symptoms of auto-intoxication. Chronic constipation. Mouth Breather.  
 Malocclusion.. Class II Division I (Edward H. Angle) Second Molars unerupted.  
 Masticatory powers reduced to 15% of normal.  
 Retarded Scholastic ability.  
 Habits: Fond of soft diet, bread, cake, coffee, milk, sugar and butter.  
 Did not care for potatoes.

## Recommendations:

Correction of malocclusion.

## Diet:

Drink 5 glasses of water daily.  
 Cocoa may be taken once daily, 1 glass of milk in afternoon  
 taken through straw.  
 All bread to be hard-dried in oven.  
 Baked apple daily.  
 Baked potatoes.  
 As calcium carriers:-  
 Hard cheese, salmon, coconut pulp, bananas, molasses,  
 celery, eggs. Fat Carriers:-Olive oil, lime beans.  
 As iron carriers:-  
 Dried beans, peas, raisins, oatmeal, figs.

## Eliminate:-

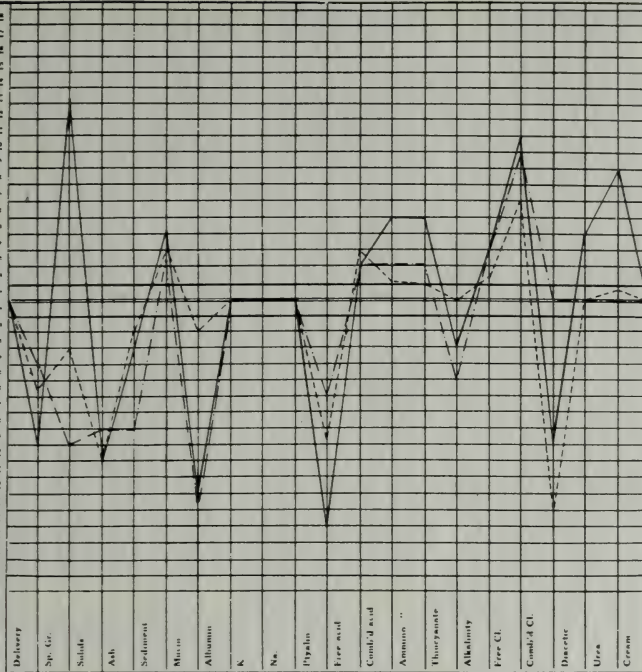
Excessive salt, sugar (except maple sugar) salt butter, coffee.  
 All soft bread, cake and biscuits.  
 Salted meats and fish, such as ham, bacon, salt-mackerel, etc.

## SALIVARY PLOT

Normal.

Below.

Above.



Patient Miss C. B. File #1214

Date January 6, 1917.

June 18, 1917.

June 21, 1918.

Key # 2.

CHART VII.—Shows the salivary plot of the same child with a continued improvement in most all of the findings.

CHART VI.—Is the case history of a child twelve years of age. The malocclusion was reduced, child became a normal breather; the auto-intoxication was corrected, running sore on leg healed; the masticatory power was re-established, and the child grew 3 inches in height and gained 20 lb. in weight in 18 months.

centrifuge. Subtract the amount of mucin found in "IV (c)" to find the quantity of albumin.

*Potassium Base* (Bernard R. Le Roy). To 1 cc. of the centrifuged specimen, add 1 cc. of 95 per cent. alcohol and 1 drop of a 5 per cent. solution of platinum chlorid. A precipitate shows the presence of potassium base. Centrifuge to determine the relative amount.

*Sodium Base* (Bernard R. Le Roy). To 1 cc. of the centrifuged specimen, add 1 drop of a saturated water solution of potassium antimonate. A precipitate indicates the presence of sodium. Centrifuge to determine the amount, and compare with the potassium, reporting the stronger base.

*Total solids and ash.* Determine immediately upon delivery of specimen to avoid error through evaporation of moisture.

Use a platinum or fused dish of constant weight which has been kept in a desiccator over sulfuric acid. Weigh the dish accurately and rapidly, then introduce 2.5 cc. of the well-mixed specimen, and heat in a drying oven not over 100° C. for 2 hours. Then place in the desiccator over sulfuric acid for 12 hours or longer, and weigh accurately and rapidly.

The difference between these weights represents the weight of total solids. To calculate the percentage, divide by 2.5 times the specific gravity.

Add to the dish two or three drops of fuming nitric acid, and heat over a flame, keeping the dish two inches above the top of the flame, until the color has become white. Heat in the direct flame until glowing, place at once in desiccator to cool for one or more hours and weigh. Calculate the percentage of ash as of total solids.

*Caution.* Do not entirely close the cover of the desiccator until the dish has partly cooled, otherwise the sudden heating of the air will raise the cover or create too great a vacuum.

The difference between total solids and ash may be charged to combined chlorin, and the percentage (as determined for the solid and ash) when added to the free chlorin finding represents the *total chlorin*.

After the examination of one thousand cases in the last ten years, your essayist has established normals within physiological limits, for each of twenty properties in the saliva. These normals will require modification after more extended

observations, but they are sufficiently constant for a basis of scientific study.

To alter the character of a plot, requires continued dietetic, hygienic and oral functional changes, and the complexity of the findings requires extended study and as in the analysis of other secretions, we never find two specimens alike in any of their constituent properties. In the analysis of the urine we find but few parallels; for instance, when the chlorin is high, the urea is low, and *vice versa*. In the salivary secretion we are unable to find any decided parallels, but in a greater percentage of the cases when the acidity is high, the ptyalin is low. When the sediment is high, the acidity is high. When the thiocyanates are very low, the ptyalin is low. When the thiocyanates are high, the time of delivery is slow, and specific gravity, mucins and solids are very high.

#### METHOD OF STUDYING AN ANALYSIS.

In studying an analysis I proceed somewhat after this plan. I review the family and case history; functional condition of the teeth, pathology of the soft parts and radiographic findings of the pulp tissues and alveolar regions. In addition to this, I consider a list of natural selected foods for a week previous to the examination. The crushing value of the teeth is estimated by the percentage of inclined planes in occlusion (206 being normal for 32 teeth). The percentage of the molar inclined planes compared with the premolar and cuspids, in my opinion, establishes for man the percentage in calories of proteid and carbohydrate food normally consumed per day. If the case under consideration is one of malocclusion, correction is recommended, and if teeth are missing bridge work to re-establish the missing inclined planes is supplied.

The next consideration is the relation of the consumption of water to the time of delivery. It will be found that patients who do not consume a normal quantity of water per day, and those who consume water with their meals are slow



in their time of delivery of 20 cc. of saliva. This slowing up results in a concentration of the specimen, increasing the specific gravity, solids, and ash per cubic centimeter. An intensive study shows some parallels in these findings, but this concentration is productive of a chronic pathological condition of the mucosa, and we find the percentage of sediment increased by the accumulation of dead mucous tissue in which bacteria find nourishment for multiplication. Patients suffering this condition feel it a necessity to wash down their food with liquids which still further inhibit the salivary flow. The *solids* and *ash* findings are more basic, and indicate the metabolic condition of the whole system. When they are excessively high we know that the salts that should be retained in the cellular elements of the body are rejected and are floating in suspension in the blood, thus reaching the saliva and in extreme conditions are thrown out of suspension in the mouth to form salivary calculus. To eliminate this factor it takes months of correct living if the lesions in other organs have not passed beyond nature's ability to repair.

The free acid findings are the most valuable, as they are indicators of excessive acid salts consumed per day, augmented, however, by their relations to the acid-forming bacteriological pockets in the intestinal tract, and the quantity of free chlorin which is trying to find its way out of the body when the eliminating organs, kidneys and skin, fail to work.

Combined acids indicate a more chronic state of acidosis and it is necessary to break them up to procure a reading. This finding responds to treatment more slowly.

Mucin in a resting saliva is normally present about 7/40 cc. in 10 cc. In the presence of any lesions in the mouth or distant organs this percentage greatly increases, and in some cases of habitual meat eaters it will appear very high with the proteolytic ferments when all other properties are normal.

Esbach's albumin and globulin are indications of pathological conditions, but

are readily eliminated except in chronic kidney disease.

Thiocyanates appear in health about 1:10,000 parts. In febrile conditions they disappear to 1:25,000 parts; in heart affections they re-appear as high as 1:4,000 parts.

Diacetic acid and urea are pathological findings and usually disappear under treatment. They represent an overflow from the blood owing to the lack of elimination through the kidneys and are not present in normal specimens under my technique, which does not agree with statements of recent writers.

Cream. This term is given to the oily products rising to the top of the centrifuge tube and in extreme pathological cases can be estimated at two- or three-fortieths cc. in 10 cc. It might be said that in tuberculosis this finding reaches its maximum. Dr. Koch recognized this material, and collected the sputum in his sanitarium. He developed an agitating machine consisting of bottles containing marbles which when rotated, produced large quantities of fat, which he emulsified, making soap, which is believed to be the product of bacteriological action on the dead epithelium and pus in the mouth. This product disappears after the elimination of the lesions.

#### DIETETIC RECOMMENDATIONS.

Let me add here a few axioms which govern my dietetic recommendations. These simple rules have been gleaned from many workers as well as my own observations.

*First.* As a grand principle, every mouthful of food should be masticated one minute.

*Second.* Recommend those foods which carry the chemical properties you desire and which are seasonably grown in the region in which your patient lives. After the review of each case, the selection of the diet is made for foods carrying the desired quantity of potassium, sodium, phosphorus, iron, etc., as the pathological symptoms are indicated by the analysis.

*Third.* That normal consumption of pure water be practiced daily, after or between meals.

*Fourth.* No liquids served at meals.



*Fifth.* No complex mixtures of foods, such as carbohydrates and proteid substances shall be served in one dish.

*Sixth.* That bread should be eaten hard-dried without salt butter.

*Seventh.* That milk should never be drunk direct from glass, but through straw or nipple.

*Eighth.* Elimination of salts and sugar except for seasoning in the cooking.

*Ninth.* Defecating habits should be adhered to rigidly after each meal.

Every new science has a right to claim for itself its maximum field of endeavor, and the child of four to six years of age is the subject upon whom the greatest results can be attained by this method of correction.

Orthodontists realize the necessity of filling cavities for children, in order that during their formative periods pernicious habits may not be encouraged

which will result in the breaking down of nature's process of reducing food for assimilation. How much more important is it, then, that we establish and control proper dietetic habits!

Time will not permit me to extend further into the detail of this work, but I hope I have given sufficient basis for my contentions, that the hygiene of the mouth may be controlled through the means of dietetic recommendations and salivary analysis and thus reduce caries of the teeth and erosions of the oral cavity. This work is presented to you as a report of an earnest worker in the interest of dental science and public health.

104 EAST 40TH ST.

[See also *Discussion*, as reported under "Proceedings of Societies," this issue.]

## Histo-pathology of the Jaws and Apical Dental Tissues.

### No. IX:

#### Abscesses—So-called Alveolar Abscesses.

By EUGENE S. TALBOT, M.D., D.D.S., Chicago, Ill.

HAVING studied the results of varied irritations and infections upon the peridental membrane and alveolar process, we are now prepared to extend our researches still deeper into pathology, and take up the subject of abscesses.

Abscesses associated with the teeth for general discussion may be divided into four classes: so-called alveolar abscesses, alveolar abscesses connected with sinuses in the teeth, peridental or metastatic abscesses, and pulp abscesses.

An explanation is necessary here in regard to this classification. We have seen in former articles on "Bloodvessels" that they may not only enter the

root of the tooth at the apical foramen, but at any locality between the crown and the end of the root of the tooth. An alveolar abscess, then, is not always located at the apex, but may be located at any point on the root where an artery enters the tooth, other than the normal foramina, or where irritation and infection due to faulty mechanics occurs. This might be mistaken for a peridental abscess. The source of irritation and infection is the same as that at the apical end of the root and it must be classed as an alveolar abscess.

A peridental and metastatic abscess may be defined as one located in the peridental membrane or fibrous tissue, which

was once originally alveolar process, or in the dental pulp and is due to infection from without the root or other sinuses of the tooth.

#### SO-CALLED ALVEOLAR ABSCESSSES.

I have purposely made this classification\* and have placed the so-called alveolar abscess at the head of the list because, since the X-ray has come into use as a method of diagnosis, the dental and X-ray professions have called every dark area at the apical end of a tooth an abscess.

A closer study with the microscope of the pathologic changes which take place in the tissues, including simple irritation (stimulation), bone absorption, infection, inflammation and abscess, will show us that a large percentage of so-called abscesses are not abscesses, but simply denuded tissue with or without absorption or caries of bone. It is unfortunate that many of our ablest teachers and writers have not discovered this mistake and hastened to correct their statements in their leading textbooks and articles in the journals.

The study of the so-called alveolar abscess at this particular stage of dental evolution, especially by X-ray pictures, is not out of place at this time. There are certain facts in pathology which cannot be ignored. Many of these facts have been demonstrated in nearly every picture shown in former articles. I have already called the attention of X-ray men to this point and have asked them to improve their methods so that a more definite and clearer diagnosis may be obtained.

I must again call attention to the fact that most writers and teachers, as observed in our textbooks and journals, still cling to the theory that all pathology is the result of infections. This is far from the truth. In considering the

subject under discussion, we must not lose sight of the fact that nearly all the former experiments and tissue changes in this series of papers were the result of irritations, and that infections which rarely resulted were due to faulty manipulation.

Besides the irritations which we have already demonstrated there is another type of irritation which enters into the formation of the pathology of the jaws and apical dental tissues which must now be considered. I refer to the gases which develop from decomposition of soft tissues in the root canal, in the tubuli of the dentin, in the interdento-cemental space, the arteries radiating from the root canal, arteries caught in the dentin and cementum coming originally from the nest of arteries at the base of the dental papillæ, and in the lacunæ of the cementum. While writers have casually mentioned this decomposition and gaseous formation in tissues other than the root canal, attention has not been given to the subject which its importance demands. The illustrations shown in this series of articles must convince every thoughtful observer that no matter how well a root canal may be filled, more or less irritation from decomposing tissue in other parts of the roots must occur.

Very few canals are properly filled, probably not five per cent. Sooner or later decomposition with expulsion of gas will occur at the apical openings. In many cases in which the roots are well filled, there are collateral openings which remain untreated and unfilled.

If gases escape from the root into the peridental membrane, they become an irritant, just as we have seen occur when a drill or filling material passes through the root, or drugs are pumped through the root canal. Naturally the results will be the same, due to irritation, namely, absorption of bone and root, and later destruction of the fibrous trabeculæ. To what extent destruction of the tissue takes place will depend upon the quantity of gas escaping and the severity of the irritant.

Sometimes the irritant is very slight and the radiograph picture will show

\* I first called the attention of the profession to this classification in the discussion of Dr. Arthur D. Black's paper on "Roentgenographic Studies of Tissue Involved in Chronic Mouth Infections," read before the American Medical Association in 1917 and 1918.

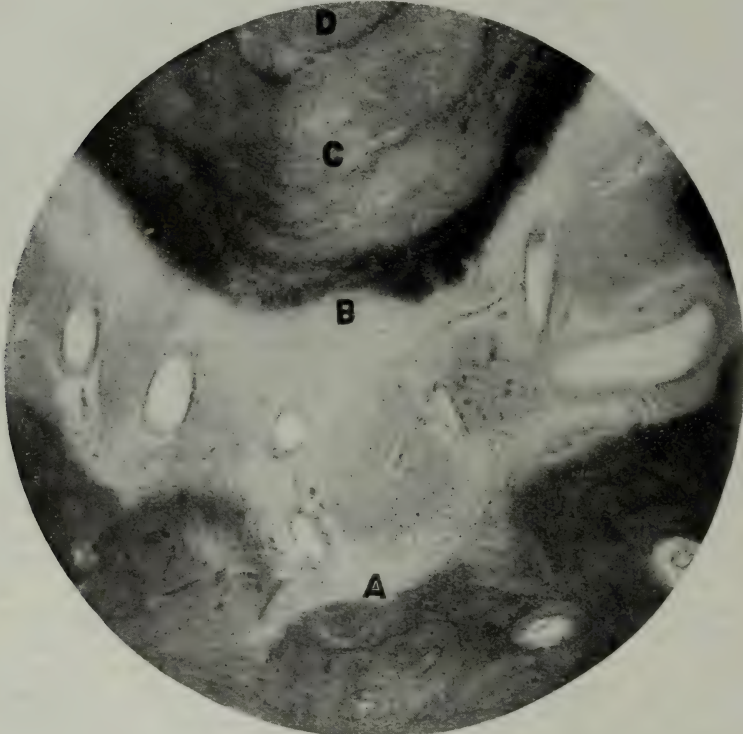


loosely arranged bone tissue. Again, the irritant may be severe enough to destroy all bone tissue, leaving the fibrous trabeculae in position. In such pictures the compact bone tissue is not present; only the fibers are seen. When the irritant is severe and constant, the fibrous tissue is also destroyed. The root is easily outlined in the radiograph, but the

demonstrated this in many of the former pictures.

Roots of teeth poorly filled and those which have remained in the mouth for years unfilled, the apical ends of the roots of which may or may not have remained denuded, eventually turn dark and sometimes black, owing to the decomposition of the soft material (proto-

FIG. 1.



(Magn. 60.)

space is dark when the lime salts and the fibrous tissue have been destroyed.

When irritation takes place and the lime salts are absorbed, osteoclast absorption frequently occurs in the cementum. The cementum is very sensitive, as we have already seen, when irritation takes place and osteoclast absorption occurs, beginning sometimes at the outer surface of the root, and frequently in the lacunae in the middle of normal healthy cement tissue. We have

plasm) within. In many cases the tissues over the roots become dark and stagnant blood remains in the blood-vessels. Frequently this stagnant blood will cause a dull local pain, and often headaches result.

The removal of the tooth will relieve the stasis of blood, the darkened tissues return to normal, and the local pain and headaches will entirely disappear.

If the lime salts are alone removed and the fibrous tissue is still attached

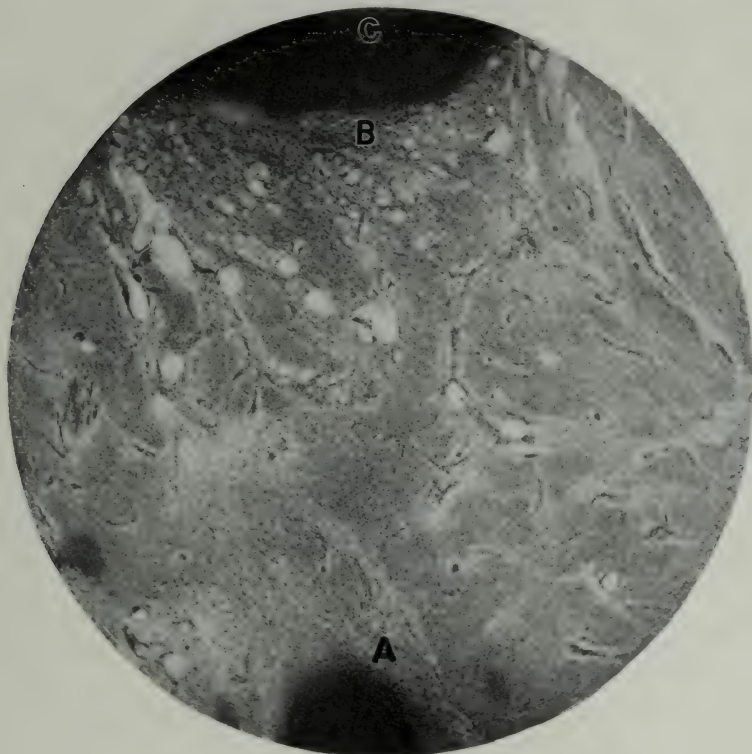


to the cementum and is in a healthy condition, by removing the cause of irritation the tissues will frequently be restored to their normal condition.

On the other hand, if the fibrous tissue has been destroyed and the surface of the cementum is in an abnormal condition so that new cementum cannot be deposited, new fibrous tissue will not be attached to the end of the root, and bone

whether cavities with or without caries or abscess are present, many teeth might be treated and saved that are now extracted for want of a better diagnosis. Because the X-ray shows a dark area around the root of a tooth, it does not always indicate an abscess. It may be that the lime salts have been removed from the fibrous tissue, or the fibrous tissue may have been destroyed, which oc-

FIG. 2.



(Magn. 45.)

substance cannot be restored. A permanent cavity, therefore, will remain about the apical end of the root.

While the radiograph is a valuable adjunct in the diagnosis of pathologic conditions of the jaws and apical dental tissue as a whole, there is still an opportunity to further improve the technique so that the degree and progress of the pathology may be correctly registered upon the picture. By definitely showing the degree of pathologic progress,

whether cavities with or without caries or abscess are present, many teeth might be treated and saved that are now extracted for want of a better diagnosis. Because the X-ray shows a dark area around the root of a tooth, it does not always indicate an abscess. It may be that the lime salts have been removed from the fibrous tissue, or the fibrous tissue may have been destroyed, which oc-

curs in a majority of cases, or an abscess may be located upon the end of the root. At the present time, we have no method of distinguishing between the three conditions by the X-ray.

In obtaining material for the study of abscesses, I selected subjects at the county morgue over thirty years of age who had died of long lingering diseases. In the mouths of these subjects, I found decayed teeth of long standing with dead pulps and also teeth, the roots of which

had been filled. Naturally, owing to disease and want of resistance, pathology in all stages in jaws and apical tissue was available.

The following illustrations are taken from the jaws of a man thirty-seven years of age who died of tuberculosis. After the jaws were removed, they were taken to the laboratory in a clean towel. Pus was found around most of the teeth,

shown. Two arteries well developed are located in the center of the dentin, but do not show in this picture. There is decomposing material enough in this space alone to cause irritation to produce absorption of bone. The root is discolored throughout. Gases are escaping from the pulp chamber, the interdento-cemental space and cavities in the cementum, causing absorption of bone.

FIG. 3.



(Magn. 40.)

due to pyorrhea. Many of the teeth were loose, owing to absorption of bone. So-called alveolar abscesses and peridental abscesses were numerous. The odor from the teeth and jaws was frightful.

Fig. 1 shows the root of an inferior cuspid tooth. The pulp is dead and decomposition is taking place. A is the alveolar process, B the peridental membrane, C the cementum, and D the dentin.

The interdento-cemental space is well

Bone is only partially removed by haliteresis. A faint line of bone at different localities may be readily observed between the root and the normal bone tissue. Arteries are also seen which were originally Haversian canals. This is a good example of destruction of the lime salts, leaving the fibrous tissue in position.

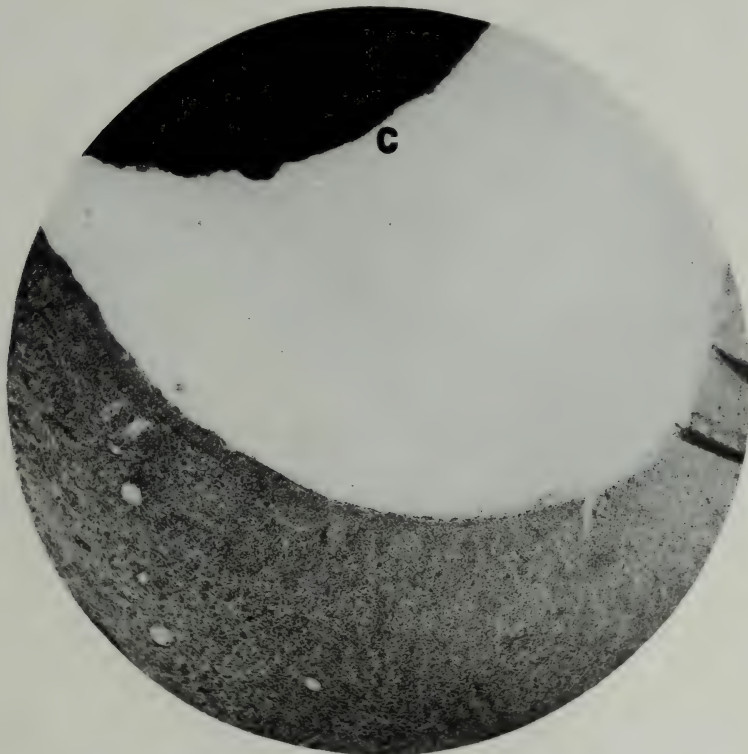
Fig. 2 is the root of a first inferior bicuspid. The pulp has been dead some time; A is the alveolar process, B the

peridental membrane, and c the cementum. The gas has produced irritation and bone absorption; halisteresis has extended quite a distance in all directions. The outer plate of bone at the right of the picture has been entirely destroyed. A lower magnification was necessary to get all the absorbed tissue into the field. Fatty degeneration is tak-

gases has not only caused bone absorption, but is more severe than in the last picture and has caused destruction of the trabeculæ. The pathology, therefore, is further advanced in this picture.

Fig. 4 is a picture of the same tooth taken lower down and a little deeper into the jaw, and is the next stage in our pathology; c is the cementum at the end

FIG. 4.



(Magn. 40.)

ing place around the edge of the cementum.

Fig. 3 illustrates the end of a root of an inferior bicuspid tooth on the left side of the mouth; c is cementum and d is dentin. The root had been filled by the ordinary methods of root filling. Some of the material is still to be seen in the upper part of the canal. Large spaces in the dentin may be seen at the interdento-cemental space which once contained soft tissue. Irritation from

of the root. The irritation due to decomposition in the pulp chamber and defectively formed tissues has caused most extensive and severe irritation, resulting not only in absorption of bone, but of the fibrous tissue (trabeculæ) as well. The extent of bone absorption in this locality is marked; it extends down to the main trunks of the nerves, arteries and veins, and includes the outer plates of the jaw.

In the dried specimens (skulls); when

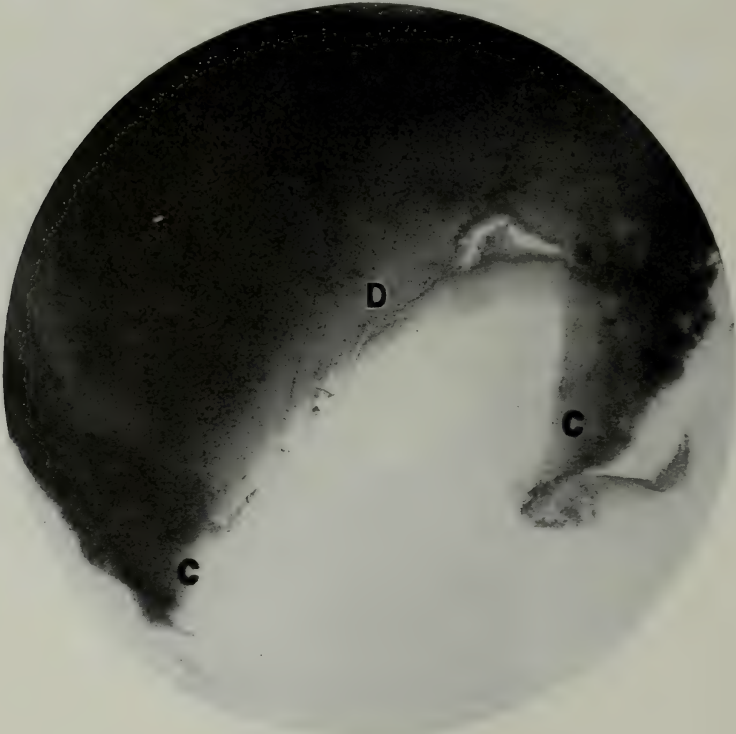


the soft tissues are removed and large cavities are seen through the bone over the end of the root of the tooth, it does not always mean that an abscess has formed and that the cavity is due to the abscess. In many of these specimens the cavity was caused by bone absorption without infection, as shown in this picture.

in bone absorption so that there is very little left of the alveolar process.

In connection with this pathologic work the question might be raised, Did not the tuberculosis, a constitutional disease, enter as a factor into bone absorption? I would answer, Yes. The low resistance in all constitutional diseases causes bone absorption to a greater or less extent,

FIG. 5.



(Magn. 40.)

Fig. 5 shows the root of a right superior first bicuspid, with dead pulp and all the pathology as shown in the previous pictures, including root absorption; c is the cementum and d the dentin. The interdento-cemental space is nicely shown. The tooth has turned dark. The alveolar process has absorbed away one-half the distance of the root, and the root was quite loose. The irritation, due to tooth movement, has assisted greatly

especially of the alveolar process. Bone absorption, however, due to constitutional disease alone without local irritants is general and not circumscribed and can be easily distinguished.

I have plenty of material from humans, dogs, monkeys and other animals showing bone absorption in constitutional or wasting diseases; this will be written up and illustrated later.

In conclusion then the pathology just

described under the heading "So-Called Alveolar Abscesses" is not unlike all the other pathology previously demonstrated in this article. Absorption of bone, no matter what the cause, must progress along the same lines, due to irritation. A majority of cases diagnosed as "alveolar abscesses" are not abscesses, but cavities around the apical end of the root due to absorption of bone and the trabeculae.

The tissues in which the disease progresses are not located in compact bone tissue, but in loosely cancellated structure. There is no redness, heat, pain nor swelling, therefore, it is a degenerative process precisely the same as that which takes place beginning at the outer surface of the alveolar process and progressing toward the tooth apex, and which I have called "interstitial gingivitis." The odor from the diseased teeth and alveolar processes in the sick room is almost unbearable. The early

extraction of such teeth, which must always be performed, one at a time, will relieve the patient of pain and a disagreeable mouth and in a measure place the room in a hygienic condition for the nurse and friends.

This accumulation of gases in the tooth substance will sooner or later cause irritation and inflammation of the peridental membrane. This becomes thickened, causing absorption of the adjoining alveolar process. The tooth may and often does become loose in the socket. Pus germs may and do collect in the peridental membranes, which are absorbed into the system. The X-ray cannot by our present methods discriminate between a healthy or diseased peridental membrane, and, therefore, when systemic disease is present extraction of pulpless teeth is always indicated.

31 N. STATE ST.

(To be continued.)

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## A Rational Treatment for Pyorrhea Alveolaris.

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By WM. CRENSHAW, D.D.S., Atlanta, Ga.

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**A** RATIONAL treatment of disease must be a procedure which is based upon a proper diagnosis of the malady in hand. But we need not wonder that a rational treatment for pyorrhea alveolaris should have been so long forthcoming, as only recently have the forms of bacteria concerned in its origin seemed definitely settled, and its location and what is to be treated has all this time been misunderstood; its effects and results have been treated instead of the malady itself. Consequently no more evident misunderstanding of a malady has ever existed, and hence the failures and the belief that pyorrhea cannot be successfully coped with. It has never

been and never could be successfully treated on the lines heretofore pursued.

Pyorrhea alveolaris is a bone (alveolus) infection and destruction, and therefore calls for that means which will eradicate the infection, before any permanent relief can be expected.

Employing the X-ray we are led to see the burrowings of the forms of bacteria which operate in this destruction, and we are thus led into the pockets running irregularly and erratically about in the alveoli.

The direction most generally followed in this destructive process is the line of the dental ligament—down the interstice between the root and the alveolar

wall—with lateral incursions into the cancellated alveolar structure, when and where the destruction runs commensurately with the growth of the bacteria concerned.

The method of treatment is surgical. The *sine qua non* of this treatment is the removal of the infected bone. This is not difficult, as might be inferred, but with suitably sized round burs of from Nos. 2 to 7 for both the right-angle and straight handpiece and some special forms of files and bone curets, this work may be effectively done. The burs, if new, should be dulled before introducing them between the teeth, and extreme care should be observed in their introduction to prevent catching them between the teeth and doing harm. The bur should be borne down toward the root apex, even if pushed through the gum, in order to enter at a point where the space between the teeth is wider and widening as we proceed toward the root point.

Bacterial destruction goes on only at the surface of the tissue being destroyed. So that when a burrow is found we have only to curet this out to be able to remove the infection throughout its extent. Some practice, however, in this line of work is necessary to be able to determine when the bur has removed the dead mass, and when it comes in contact with the live tissue. Necessarily the tactile sense is what we must depend on to accomplish this and the form of the tooth around which we are working must be used as a guide when we touch it, for it must be touched lightly to prevent marring it; and while a dull bur will remove as much of infected bone as need be, it would have to be forced against the tooth root to do harm.

We are assuming that the point operated on has been anesthetized, and an untrained hand could and likely would cut beyond the health line because of the insensibility due to the anesthesia.

The pyorrhea specialist working on the line here suggested will have found that burrows quite frequently begin in the septa between the bicuspid and molars and between the molars of the maxillæ and run the length of the roots

of the teeth, without touching them, and quite frequently burrow into the maxillary sinus before the patient is aware that anything is wrong. The X-ray is of supreme value here, as it shows us what is wrong and what is to be done. This state of affairs is so frequently found that the writer is convinced that practically all antrum perforations are due to pyorrhea burrowings, and rarely ever due to alveolar abscess, which in former decades was thought to be responsible for all such perforations.

These burrowings, be it said, in some cases give no outward sign of existence, by which is meant no inflammation or separation of gum from the teeth, or other evidence of trouble, excepting the pain in the region caused by engorgement and swelling in the antrum when this condition manifests itself.

With heavy loss of the alveoli around the roots of upper molars, though the points of the roots are imbedded in the alveolus and the teeth firm, there is little chance of keeping such teeth permanently in the mouth; and while they are the most difficult of all to be treated, and with less chance of success, the right-angle bur, skilfully handled, is the best means for doing what can be done. The exposure of the necks of such teeth from the loss of the alveolus and the consequent lowering of the gum upon it, occasionally brings on irritation of the pulp, because of the extremes of temperature to which they are subjected and were never intended to be subjected. This in instances necessitates that the pulps be taken out of the teeth.

The lower molars quite often have burrows running through the crotch formed by the roots. These may be more easily treated than the upper ones; but all such teeth diseased to this extent are not to be depended on for long service. The bur, however, in the right-angle is altogether the best means of cleaning off the inner root surfaces of the crotch, and also for burring the infection from the bone lowered to whatever extent it may be.

The specialist has presented to him from time to time pyorrheal abscesses,



which run along beneath the periosteum and develop at a point somewhat remote from the starting-point, then backfire, so to speak, after the pus forms, discharging through the channel leading to the abscess.

To treat these cases where burrows are sometimes found running beneath the gum and just under the periosteum and in others beneath the plate of bone, the use of a long tapered shank No. 2 or 3 bur, in the straight handpiece will be necessary to remove the infection. The small tapered shank of sufficient length is essentially necessary to prevent tearing and stretching apart the thin layer of gum overlying the bone.

Practicing in this line wholly I have been led into cases where one or more of the roots of multi-rooted teeth will have burrows extending to the points of some of these, and ulcerate the pulp in two roots, while the pulp in the other roots and in the pulp chamber remains alive. These cases are prolific sources of neuralgia, with the cause hidden to the usual diagnostician, and may be relieved, in the upper molars particularly, by removing the pulp entirely and by amputation of the crippled root or roots.

It is well to bear in mind that failures in this method of treatment will be met

in those cases where a very great amount of the alveolus has been destroyed before treatment is begun. But out of the well-nigh universal existence of the malady by the combined application of the treatments presented in this and the subjoined article by Dr. Clement, incalculable good can be done for that proportion of pyorrhea which is treatable—a treatment which the writer believes forms the basis of successfully handling pyorrhea alveolaris not only in eradicating the malady in individual cases, but will, if followed up through family lines for a few generations, practically eliminate it.

The writer, therefore, offers this method briefly, which he has been practicing for the past five years, and has presented publicly before the Georgia State Dental Society, Atlanta, in 1918, and to Atlanta dentists, and as one of the special feature clinics before the Mid-Winter Clinic, Atlanta, 1918, and teaching it regularly in the Atlanta-Southern Dental College.

The treatment of tumefied and hypertrophied gums, ably worked out by Dr. George B. Clement, Meridian, Miss., is presented in the following article.

619-621 GRANT BLDG.

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## Treatment of Tumefied and Hypertrophied Gums.

By GEORGE B. CLEMENT, D.D.S., Meridian, Miss.

**A**FTER thorough treatment as outlined by Dr. Crenshaw, there still remains, in many cases, an unsatisfactory condition of the gum tissue immediately surrounding the teeth. Soreness, tenderness, redness, and often tumefaction and hypertrophied lesions in a modified form continue to exist. To overcome this we use the electric cautery with definite aim and an especially constructed electrode. To more fully explain the treatment, we shall divide this paper, brief as it is, into three parts, treating each separately.

*First.*—The electrodes and electric appliance used.

*Second.*—The manner of application.

*Third.*—The results to be obtained.

### THE ELECTRODES AND ELECTRIC APPLIANCE USED.

The electrodes may be made of any high-fusing metal or alloy. Platinum is rather too soft, as some of the points must be very delicate, when platinum would bend under heat and fail us of our object.

Platinoid in sheet and wire form is very good. We are now using ankrite, 18 to 24-gage wire and 26-gage plate.

The point of the electrode is made by bending the wire, or cutting the plate into V-shaped points from one-half to one inch in length. To each heel point of the electrode, whether of wire or plate, we solder No. 10 copper wire, using 18-k. gold solder. Now press the heel wires of the electrode together, placing between them a small piece of flat vulcanite rubber about one inch long and about one-eighth of an inch in width, and

grooved to hold the heel wires in place. This is the insulator and is to be wrapped with No. 1144 silk floss. After wrapping, tie the ends of the floss and moisten with shellac varnish to keep the knot from untying. Now flatten and file the extreme point of the electrode until the resistance showing in a red heat will be centered at this point, and the electrode is ready for use.

We use the McIntosh and Victor No. 1 cautery handle, and the Victor alternating-current cautery transformer for reducing the voltage. It is very important that the heat be under perfect control, and that the temperature of the electrode point be stable and subject to increase or decrease, as several degrees of heat are required in this treatment, of which we shall speak later.

### THE MANNER OF APPLICATION.

Usually it is best to wait from one to three weeks after the Crenshaw treatment—the removal of the infected alveolus—before the electric cautery is used. This for two reasons: First, to give nature an opportunity to do her work; and again it is not a good plan to use the cautery in the presence of either acute or chronic inflammation, at its height. Then after the gums have assumed a near normal condition, we proceed with the cautery as follows: Commence at some definite point, say the upper right tuberosity, and work forward. Judgment will have to be used as to how many teeth will be treated at a sitting and how severe the application. All approximal and interproximal gum tissue will need a slight applica-

tion, and a thorough application lingually and labially. The procedure is as follows: Inject a few drops of a one per cent. solution of a local anesthetic just at the highest point of the gum, or whatever of gum tissue is present between the teeth. This will be midway, mesiodistally, of the interproximal tissue. This to be done lingually and labially with each tooth to be operated on, and an average of three at a sitting. Now take a properly shaped electrode, go in from the side and lift out the small elevations from between the teeth. Next, with properly shaped electrode, split the gum up and down between the roots, anywhere from two to six mm., then pass the thin electrode in between the teeth, at not more than a cherry-red heat, and pass to the next interproximal space.

After the work is done with the electrode, swab out each burn with a small pellet of cotton wrapped on a suitable applicator, carrying a solution composed of equal parts of pure carbolic acid and oil of cloves. Wash out the mouth with warm water, or better, spray it with a suitable solution, and dismiss patient with directions to return the following day, when the treatment is continued until the entire mouth is gone over in the same way.

As to the degrees of heat to be used: For cutting out the elevations and hypertrophied tissue between the teeth, a near-white heat is desired. For splitting the gum tissue and passing in between the teeth, a dull-red heat, tending to black, is preferred. The reason for this is that for removal of tissue only the white heat is best, for we are only expecting excision, but where we are looking for a therapeutic action to follow the application, as we do in splitting the gum

and passing the electrode in between the teeth, the latter heat is preferable.

#### THE RESULTS TO BE OBTAINED.

The application of the cautery, as set forth, will change the condition of the inflammation from chronic to acute, thus giving nature a chance to start over and do her work under more favorable conditions, the Crenshaw treatment having removed the infection—the source of irritation and disease in the bone.

Burns never cease to contract, and for years the gum tissue will be drawn into closer contact with the tooth, and a form of scar tissue will be the result. In splitting the gum up and down, we induce a tucking in as the wounds gradually heal.

In passing the electrode between the teeth, at the cherry-red heat, we withdraw on the blade of the electrode in a coagulated form all of the diseased gum tissue which would otherwise remain and prevent healthy granulation.

The above is the shortest possible exposition of the cautery treatment. There is much to be said on the subject and we hope jointly in the near future to more fully elaborate both aspects of this treatment.

To succeed, however, as a whole, the work must be done with care, caution, and intelligence. Every single application of the scaler, bur, and electrode must be made for a specific purpose and as before stated, the extent of the application depends upon the extent of the disease and the nature of the case. Good judgment and careful work will bring results of which the patient as well as the operator may be proud.

205 COCHRAN BLDG.



## An Interpretation of Angle's Classification of Malocclusion of the Teeth Supported by Evidence from Comparative Anatomy and Evolution.

By MILO HELLMAN, D.D.S., New York, N. Y.

(Read before the annual meeting of the Eastern Association of Graduates of the Angle School of Orthodontia, held in New York, May, 1919.)

IN the present reign of general confusion, it seems rather a pretentious hope to assume that some benefit will accrue to even an infinitesimal fraction of mankind through an effort to clear up any disputed questions and yet it is of considerable gratification to be conscious of an earnest effort in the attempt to bring about a better understanding on some important questions, even though it be in so small a sphere as that of our specialty. At the same time, we take advantage of the opportunity for recording, in this feeble manner, a keenly felt aversion to the existing confusion in all present human affairs and against its possible effect in the future. For confusion, brought about as it usually is by the *misinterpretation* of natural manifestations and the *misunderstanding* of their real significance, must terminate in *chaos*.

The progress of orthodontia, like that of other branches of science and art, has not rarely been handicapped by similar conditions. Owing either to timidity or to indifference, many of us prefer not to question unclear statements, or to discuss mooted questions. As a result, a great deal of misunderstanding has arisen which tends to produce confusion with regard to some of the fundamental principles supporting the scientific structure of our specialty. I shall, therefore, make it the burden of my present contribution to bring some of the points in question before this society, and if pos-

sible shed a ray of light upon them by means of evidence gathered from studies in comparative anatomy and evolution, in the effort to effect a uniform interpretation of their meaning. It must, however, be understood at the outset that not caviling but rather a sincere desire for unanimity is the incentive of this motive.

The questions to be considered are: (1) The classification of occlusal anomalies as proposed by Angle; (2) some of its features relative to diagnosis, and (3) certain terms applied in its description.

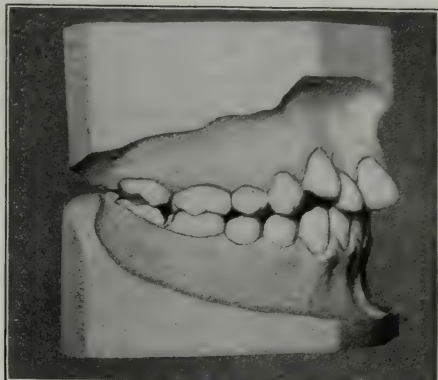
Much credit is due to Dr. Edward H. Angle for the classification of malocclusion of the teeth so generally known and extensively adopted. By this step he brought considerable law and order into the prevailing chaos pertaining to the conception of the manifold forms to which "irregular teeth" gave expression. Though many attempts had previously been made at sorting out, so to speak, the different forms in which malocclusion of the teeth appears, no one succeeded in working out and bringing to the attention of the profession a classification so *simple* as that by Dr. Angle.

The conception of "irregularities" of the teeth antedating this classification must have been similar to the ancient and well-known description of the convolutions and fissures of the human brain as simulating the appearance of a dish of macaroni. Although the step from

FIG. 1.



A



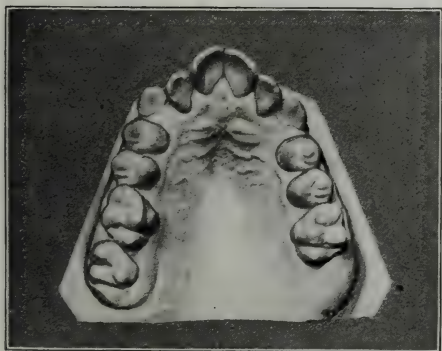
B



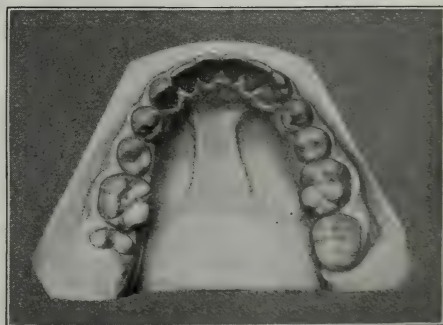
C



D



E



F

Casts of a case of malocclusion: A, showing front view; B, showing right side that is apparently in distal occlusion; C, showing left side, the teeth of which are in normal mesio-distal occlusion (see Fig. 1 B); D, showing lingual aspect of right side, the molar cusps of which are in normal mesio-distal relation (see Fig. 1 B); E, showing occlusal view of upper dental arch, the right molar being rotated; F, showing occlusal aspect of lower dental arch.



the "dish of macaroni" conception of "irregular teeth," to the present classification by Angle is extensive, it must not be forgotten that this particular phase has, thereby, not reached its finite stage, and that it does not now stand absolutely perfect. In all its simplicity, the Angle classification does not convey exactly the same idea to everyone. This is, perhaps, due to the fact that its definition is not sufficiently accurate. For instance, if the casts of the case of malocclusion illustrated by Fig. 1 A, B, C, D, E and F, are carefully examined, there will be considerable difference of opinion regarding its classification; *i.e.*, there will be many who may not agree with me nor with one another as to the class to which it really belongs. Results of previous tests of this character made on several occasions are sufficient proof to warrant my contention. This undoubtedly shows either a lack of knowledge of the underlying principles of this classification, a lack of uniformity in interpretation, or possibly a lack of clearness in definition. As a consequence, the question of classification can rarely be properly discussed without considerable confusion being brought about by its unnecessary complication with *diagnosis* and *treatment*.

The prevailing tendency to complicate classification with diagnosis and treatment also becomes manifest upon consultation of the writings of the highest authority on orthodontia. Thus, referring to his classification, with which the entire profession is, or should be, thoroughly familiar, Dr. Angle in his work on "Malocclusion of the Teeth" (seventh edition) states, that "these classes are based on the mesio-distal relations of the teeth, the dental arches, and jaws which depend primarily upon the positions mesio-distally assumed by the first permanent molars on their erupting and locking. Hence, in diagnosing cases of malocclusion," says he, "we must consider, first, the mesio-distal relations of the jaws and dental arches, as indicated by the relation of the lower first molars with the upper first molars—the keys to occlusion; and second, the positions of

the individual teeth, carefully noting their relations to the line of occlusion." In these two sentences, as may be seen, there are implied several ideas, each of which may be considered as independent of the others. Thus we have first, the foundation upon which the classification is based; secondly, diagnosis based upon the same principles as those underlying the classification; thirdly, treatment, though not indicated, is implied for the entire scheme of the classification, and diagnosis is conceived of as an adjunct to the methods advanced in the correction of malocclusion and, lastly, a terminology explaining *classification* and *diagnosis*.

It will be of advantage to clear up first these questions before attempting any explanation of a basis for the scientific interpretation of the classification itself.

#### EXPLANATORY TERMINOLOGY CONFUSING.

Upon a consideration of the terminology employed in describing malocclusion of the teeth, it will at once appear that considerable confusion must arise by the indiscriminate use of the term *mesio-distal*. Applied to the teeth, it is a descriptive term indicating the direction between the median or sagittal and the distal or lateral plane of the body. As interpreted by G. V. Black, the dental arch is conceived of as a line, a curved line, bisected in the middle at a point indicated by the proximal surfaces of the central incisors, which also corresponds with the median line of the body, and terminating with the surfaces of the last molar teeth pointing in the opposite direction from those proximating in the incisors. The surfaces of the teeth pointing toward the median or bisecting line of the dental arch are, therefore, called the *mesial* surfaces, while those pointing away from the median line are termed *distal* surfaces. Furthermore, the axis of a tooth directed between these two points is called *mesio-distal*, just as that between the cheek and tongue is called *bucco-lingual*. It must, however, be remembered that these terms are applicable to the individual teeth alone as they are



thought of in relation to their position in the dental arch. But when the dental arch is spoken of as a whole, *i.e.*, as a unit, it implies a conception of all the teeth of one jaw taken collectively. It is, therefore, incorrect to speak of the lower dental arch or of the lower jaw as being either mesial or distal, for such a condition cannot very well prevail. The dental arch and the lower jaw may be said to be either in an anterior or ventrad position or in a posterior or dorsad relationship to the upper; for, mesial or distal would indicate a position either toward or away from the sagittal plane of the body. Again, combining the terms indicated by the two points, the direction may be spoken of as being antero-posteriorly, or ventro-dorsally. The term *mesio-distal* is correct only when applied to a tooth, but when speaking of the dental arch or the jaw, *antero-posterior* or *ventro-dorsal* should be used.

#### CLASSIFICATION DEFINED.

To convey a clear conception as to the meaning of the terms *classification* and *diagnosis* it will be of advantage to quote some general definitions before we apply them to our purpose.

Thus, the New Standard Dictionary defines "Classification" as "The act or process of arranging by classes; a grouping into classes; the putting together like objects or facts under a common designation; a process based on similarity of nature, attributes or relations." The Standard Dictionary calls attention to the fact that a "classification based on superficial or accidental rather than radical agreements and differences is an *artificial classification*." While "A natural and true classification," following the New International Encyclopedia, "is a statement of near or remote relationships, according to the degree of differentiation the forms sought to be classified have undergone in their descent from a more or less remote ancestor." Putting this into orthodontic terms, it means: a statement of near or remote relationships, according to the degree of modification the dentitions sought to be

classified have undergone in their deviation from the condition known as normal occlusion.

Regarding diseases, Lippincott's Medical Dictionary defines classification as: "The systematic arrangement into classes, orders, etc., of natural productions and phenomena including the disease of the animal body." Thus, whether the Angle Classification is a natural or an artificial one, it well coincides with these definitions and must be accepted on its merits. It may, therefore, be said that no exceptions can be taken in so far as the classification as such is concerned.

#### DIAGNOSIS DEFINED.

The definitions found in Lippincott's New Medical Dictionary state that *Diagnosis* is: "1. The art or science of signs or symptoms by which one disease is distinguished from another; 2. The determination of the nature of a case of disease by examination. A *Symptom*, however, must be considered as a concurring circumstance happening simultaneously with the disease, serving to point out its nature, character and seat."

In Black's Medical Dictionary the following description of the term is found: "*Diagnosis* is the art of distinguishing one disease from another, and is essential to scientific and successful treatment. The name is also given to the opinion arrived at as to the nature of the disease. It is in diagnosis," says the author, "more than in treatment, that the highest skill is required, and, for a diagnosis, the past and hereditary history of a case, the symptoms complained of, and the signs of the disease found upon examination are all weighed. Often, an absolute diagnosis cannot be made at once and it becomes necessary to proceed tentatively with treatment, a careful watch being kept upon its results." This is worthy of particular notice, as it is of considerable significance in orthodontia.

#### CLASSIFICATION VERSUS DIAGNOSIS.

Thus, it may be seen that things may definitely be classified or sorted out, so

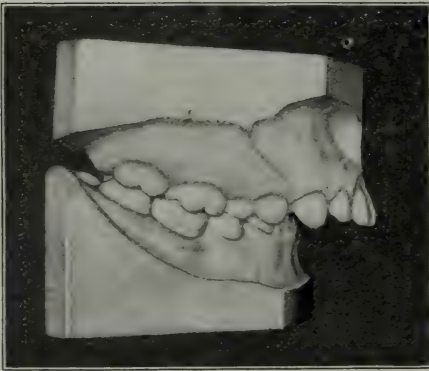
as to render their recognition more simple and enable one to say to what characteristic group a certain object or phenomenon belongs. But such a procedure does not necessarily imply diagnosis of a particular phenomenon, despite the fact that classification in orthodontia is often advanced as a basis for diagnosis.

For instance, if such an attempt were made, it would be possible to classify the anatomic manifestations due to rickets. We would then have deformities

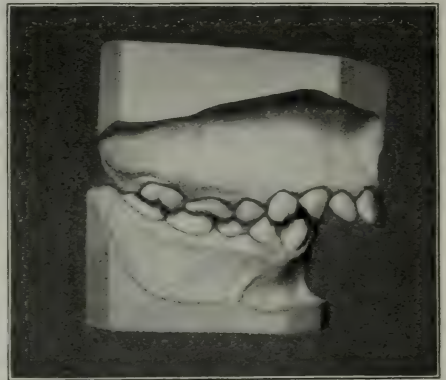
for each may have separately arisen from a different cause. Collectively, however, they present a symptom complex portraying the diversity of probable forms in which rickets may leave its imprint.

Similarly, take each class of malocclusion, it will not be possible to say definitely that because a number of cases fall into one group as designated by the class, division or subdivision they are the result of or diagnostic of the same disturbance. Every one is well aware of the fact, from

FIG. 2.



A



B

Casts of two cases of malocclusion belonging to Class II, Div. 1: A, malocclusion associated with hereditary influences aggravated by pernicious habits; B, malocclusion associated with artificial feeding and various disease processes.

belonging to groups designated by such terms as are employed in the description of the various modifications in the bony structure arising from this disease. The deformities would naturally arrange themselves according to certain particulars; there would, then, be classes presenting the hydrocephalic character of cranium, those of the chicken-breasted or pigeon-breasted variety, those being afflicted with curvature of the spine (skoliosis), those having hump-backs (kyphosis), those showing bow legs (genu varum) or knock-knees (genu valgum), those having flat feet (pes planum), etc. These classes, though presenting deformities accruing from the ravages of rickets, are individually not diagnostic,

clinical experience for instance, that no two cases of malocclusion respond alike to orthodontic treatment, regardless of their close resemblance in the occlusal manifestations. Upon thorough examination it is readily found that the diagnostic features, as outlined by the essayist in former contributions on the subject of etiology, are different in each case, though they belong with many others to the same class of malocclusion. For example, Fig. 2 A and B, represents two cases belonging to Class II, Div. 1. This, however, does not mean that they are thereby diagnosed. For, if the history of the two deviations be inquired into, there will appear such differences in the nature of their development as to



amaze the orthodontists as to the possibility of diverse causes bringing about similar effects. For instance, in the case represented by Fig. 2 A, the causative factors seem to be intimately related in general to such hereditary peculiarities as congenitally missing teeth, complicated by such environmental influences as expressed by pernicious habits. No disease processes seem to have had a share in the development of this deformity. While the case presented in Fig. 2 B is closely associated with inability of the mother to nurse, malnutrition and anemia from early infancy, a low vitality and no resistance to the ingress of various disease processes from which the patient suffered throughout life. And yet, they both belong to Class II, Div. 1.

To revert again to the simile of rickets, it may be stated that in the early diagnosis thereof, it would not be of importance to take cognizance of the classification of the deformities resulting from it, but rather immediately proceed to look for symptoms that sound the alarm of the approaching disturbance. In other words, it is essential to search for symptoms that precede the actual deformities, such as restlessness, profuse sweating, increased vasomotor irritability of the skin, inability to support the head, to sit up or to walk, etc., depending, of course, on the severity of the condition and the time of its appearance.

Thus, it may be seen that the real diagnostic features or symptoms have a close relationship to the causative factors. The evidence thereof will be manifest if just one point be mentioned. For instance, it is a well-established fact that in rachitic patients the nervous, muscular and skeletal systems are affected. It is also a well-known fact that these affections are due to a depletion in the system of lime salts. Lime is a nerve sedative and an important constituent of bone, nerve and muscle. Hence, the symptomatic search in such afflictions is of value only in so far as it identifies the phenomena preceding the resulting deformities and thereby enables the physician to resort to such means as may

prevent the further progress of the disease. So also, in orthodontia, a diagnosis in conjunction with occlusal anomalies is essential, but it must be based on the history of each case and is of interest in relation to the nature and degree of response to be expected in treatment and the prognosis as to the outcome of the case. Consequently, *classification* of malocclusion serves *only* as a basis for the discrimination in general of the various forms assumed by the dentures in their deviations from the normal, while *diagnosis* seeks to establish a relationship between the disturbance and its symptoms, so as to enable one to recognize the approach of the former by the manifestation of the latter. In other words, the classification of malocclusion is diagnostic of, or it may be considered as a basis for diagnosis of, *malocclusion* of the teeth as distinguished from *normal occlusion*. But it must not be confounded with the diagnosis of the individual case of malocclusion requiring orthodontic treatment.

#### SUMMARY.

It is quite plain, then, that the indiscriminate use of terms, such as mesiodistal, when referring to the dental arch or jaw in the description of the classification, is incorrect; and in order to avoid confusion, it is necessary to employ a terminology that will convey clearly the ideas implied. Furthermore, while the characteristic peculiarities common to each class, division and subdivision may be considered as diagnostic manifestations of the groups as such, they are not to be confounded in any way with the symptoms sought for in diagnosis. For diagnosis is essentially a process requiring a separate course of procedure and has for its object to ascertain the conditions anteceding the manifested malocclusion in the individual case. It is important, therefore, to make a definite distinction between the classification of malocclusal conditions and the diagnosis of a case. The orthodontist must, therefore, realize that the classification of a case of malocclusion does not constitute its diagnosis. For the symptoms of the



class, division or subdivision are *not* the symptoms involved in the indication of *that* diagnosis of an individual case upon which a safe prognosis may be made.

#### THE FUNDAMENTAL PRINCIPLES OF THE ANGLE CLASSIFICATION.

Regarding the merits of the features employed as distinguishing factors in the Angle classification, there would seem to be considerable diversity of opinion, judging by the evidence obtained from their practical application. This diversity of opinion appears to be due to a variety of interpretations of the fundamental principles bearing upon the boundary lines, to use a popular phrase, separating one class from another. "These classes" says Angle, "are based on the mesio-distal relation of the teeth, dental arches and jaws which depend primarily upon the positions mesio-distally assumed by the first permanent molars on their erupting and locking." Thus, while such designation may suffice as a general consideration, it is inadequate in specific instances, and gives rise to various sorts of misunderstanding. The mesio-distal designation of a molar, though apparently simple, becomes confusing when in its deviation in position from the normal, the tooth undergoes also some rotation. As may be seen in Fig. 1 E, representing the occlusal view of the upper dental arch of Fig. 1, the upper right first molar is considerably rotated as may be easily appreciated by a comparison with its mate on the left side. This composite malposition is by no means unusual, for it is found in a high percentage of all classes of cases, especially in those belonging to Class II, Div. 1. With a deviation of such character from the normal, the buccal cusps of the molars assume a position more mesially to that of the lingual cusps. The mesio-distal designation as a determining factor of classification then becomes confusing and one is rather at a loss as to which side of the scale, buccal or lingual, the weight of evidence may be cast, in order to arrive at a correct decision.

#### EVIDENCE FROM COMPARATIVE ANATOMY AND EVOLUTION ON THE PRIMITIVE LANDMARKS OF OCCLUSION.

From the various sources of information that may be invoked for the solution of this problem, the evidence gathered from comparative odontology may be applied to considerable advantage. But in order to convey a clear idea relative to the occlusal phenomena prevalent in the dentition of other placental mammals, it will be necessary to give a brief outline of the evolutionary history of the form of the molar tooth and its relationship to occlusion. To accomplish this successfully, it will be of advantage to go back an extensive period in geologic time, when the various placental mammals exhibited a more generalized type of dentition.

#### THE TRITUBERCULAR MOLAR.

It has been amply proved and extensively verified that the dentition of all

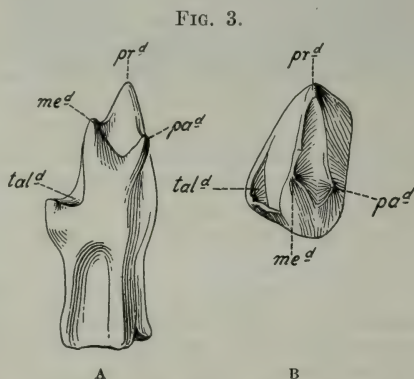
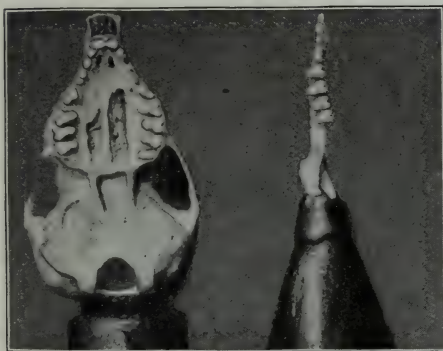


Diagram of a primitive tritubercular lower left molar (*Phascol Estes*): A, lingual aspect; B, occlusal view. (After Gregory.)

placental mammals at some period in the course of evolution passed through a stage of a uniform type of molar consisting of three main cusps arranged in a triangle. This discovery was made in 1879 by Prof. Edward D. Cope, who in 1883 applied the name of *tritubercular molar* to this type of tooth. Fig. 3 A and B, presents the lingual and occlusal

aspects of a lower left molar of this type belonging to an animal (*Phascolestes*) of the Upper Jurassic. This animal belongs to the order *Trituberculata* and is the probable ancestor to all placental mammals. As will be observed, the molar consists of three main cusps and a small spur, heel or talonid. The cusps are connected with one another by marginal ridges, which in occlusion perform the function of cutting or shearing. The triangle formed by the cusps of the molars in the lower jaw is oriented with the apex buccally and the base lingually. In the upper jaw, the position is reversed, the base of the triangle presenting buccally and the apex, lingually. This arrangement in the upper jaw leaves triangular interdental spaces for the accommodation of the spaced lower molars.

FIG. 4.



A

B

Occlusal view of dentition of the Australian marsupial mole, *Notoryctes*: A, occlusal aspect of upper dental arch showing the tritubercular upper molar teeth; B, occlusal view of left half of the lower dental arch, showing the lower tritubercular molar teeth. (*Amer. Mus. of Nat. History, New York.*)

#### THE WEDGING TYPE OF OCCLUSION.

The occlusion of the tritubercular molars is, therefore, of an alternating character and as the teeth of one jaw fit between those of the other it is termed by Dr. Gregory the *wedging type of occlusion*. But while the lower molars are wedged in between the upper molars, the

transverse marginal ridges of the opposing teeth pass each other during mastication and so constitute an efficient shearing apparatus for the cutting of flesh. A modern representative of this type of molar and occlusion is found in the Australian marsupial mole (*Notoryctes*) Fig. 4 A and B.

#### THE TUBERCULO-SECTORIAL LOWER MOLAR.

What is of considerable interest in this connection is that in this primitive type of tooth and occlusion, we have the foreshadowing of the future grinding apparatus of the molars as perfected in modern man. But it must be emphasized that the interrelationship of the teeth in the occlusion subsequently developed, is closely associated with the evolution of the form of the tooth itself. As may be seen even in the primitive molar (Fig. 3 A and B) there is the beginning of that portion of the lower molar which in the dentition of man constitutes two-thirds of its crown. The nucleus, so to speak, is represented by the spur, heel or talonid (tal<sup>d</sup>) of the tritubercular tooth seen on the lower level of the distal surface of that tooth, Fig. 3 A. During the course of evolution this portion increased in size to such extent as to overlap the lingual cusp of the upper molar behind or distally. At this stage of evolution there become manifest two portions of moieties of the lower molar, the mesial portion or trigonid, consisting of the three primitive cusps, and the distal portion or talonid, consisting of the enlarged heel with a basin-like depression. By the development of these two moieties, the *tuberculo-sectorial* molar was perfected.

#### THE LAPPING AND WEDGING TYPE OF OCCLUSION.

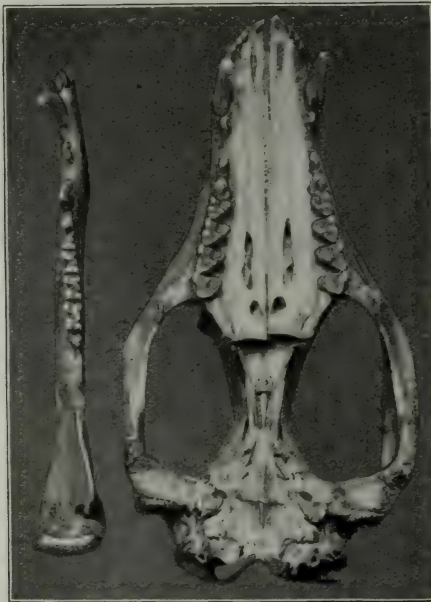
The change in form of the lower molar brings about a change in the type of occlusion. Thus the trigonid of the lower molar being on a higher plane still occludes in a "wedge-shape" manner, fitting into the triangular spaces between

FIG. 5.



A

B



A'

B'

Occlusal view of the dentition of a primitive (Eocene) placental mammal (*Sinopa*) and the modern opossum: A, showing the tuberculo-sectorial lower molar teeth of Eocene carnivore, *Sinopa*, left half of lower jaw; A', showing the tuberculo-sectorial lower molars of the opossum, left half of lower jaw; B, showing the tritubercular upper molar teeth of Eocene carnivore, *Sinopa*; B' showing the tritubercular teeth of the opossum. At the buccal marginal ridge of the upper molars the para- and metastyles may be observed. (*Amer. Mus. of Nat. History, New York.*)



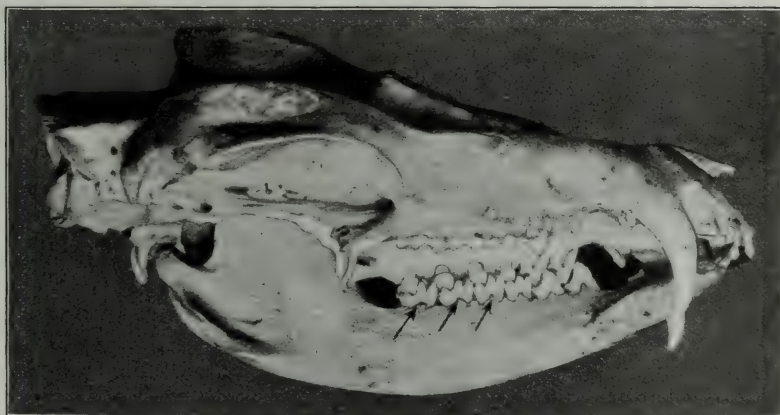
the upper molar teeth, while the talonid, being on a lower plane, laps over the occlusal surface of the lingual cusp of the upper molar behind. This type of

(A, B), and a modern representative (the opossum), possessing it (A' B'). As may be seen, the upper molars are of the tritubercular type, while the lower mo-

FIG. 6.



A



B

Dentitions of *Sinopa* (A) and opossum (B) in occlusion, viewed from the lingual aspect. Arrows indicate the protocone in occlusion.

occlusion Dr. Gregory terms the "lapping and wedging type of occlusion." Fig. 5 A, A', B, B' represents the occlusal aspect of the dentition of a primitive carnivorous placental mammal (*Sinopa*)

lars have assumed the tuberculo-sectorial modification. Fig. 6 A and B illustrates the dentitions of *Sinopa* and opossum in occlusion as viewed from the lingual aspect, showing the lapping and wedging

type of occlusion; the protocone, the lingual cusp of the upper molar, is accommodated into the talonid basin, the

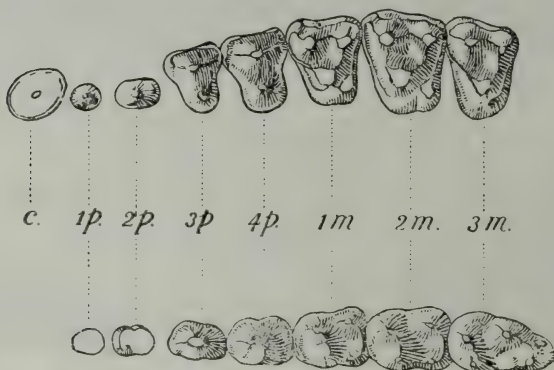
ing the dentition of a primitive Eocene primate (*Pellicodus trigonidus*) as seen from the lingual aspect.

FIG. 7.



Left side of dentition of an Eocene primate (*Pellicodus trigonidus*) in occlusion; lingual aspect. (Amer. Mus. of Nat. History, New York.)

FIG. 8.



Occlusal aspect of dentition of a primitive primate, *Pronycticebus*, of Europe, showing the fully developed fourth cusp (hypocone) on the upper molar. (After Gregory.)

primitive central fossa of the lower molar, while the lower trigonid is wedged into the intermolar triangular space of the upper jaw. The same occlusal conditions are revealed in Fig. 7 represent-

#### THE QUADRITUBERCULAR UPPER MOLAR.

The next step in the course of evolution after the completion of the talonid or heel of the lower molar by the de-

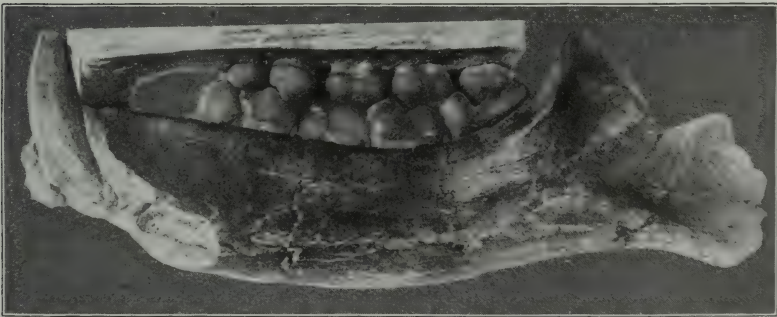
velopment of the disto-buccal, distal and disto-lingual cusps, is the development in Fig. 7 (*Peliodus trigonidus*) there is a cingulum or ridge visible on the lin-

FIG. 9.



Occlusal view of upper dental arch of *Notharctus*, direct descendant of *Peliodus*, showing the development of the pseudo-hypocone, the disto-lingual cusp, independent of the cingulum. (*Amer. Mus. of Nat. History, New York.*)

FIG. 10.



Dentition of *Notharctus crassus*, a primitive primate of the Upper Eocene, Wyoming; lingual aspect. It shows the occlusal relation of the pseudo-hypocone of the upper molar as it antagonizes the paraconid of the lower molar. (*Amer. Mus. of Nat. History, New York.*)

of the fourth, the disto-lingual cusp, in the upper molar. As may be observed This cingulum subsequently undergoes



some changes and eventually gives rise to the fourth cusp. The earliest manifestation of the fourth cusp in the upper molar in the primates is found in *Pronycticebus*, a Tarsioid (Fam. *Tarsiidae*) of the Eocene of Europe, see Fig. 8, first and second molars. This may be termed the *cingulo-hypocone* in distinction from another type of fourth cusp, the *pseudo-hypocone*. The latter is evolved in a different manner, namely,

FIG. 11.



Dentitions of modern man, European white male, lingual aspect; showing the occlusal relation of the cingulo-hypocone, the disto-lingual cusp of the upper molar, it being accommodated into the mesial fossa of the primitive trigonid basin. (By courtesy of Dr. F. A. Peeso.)

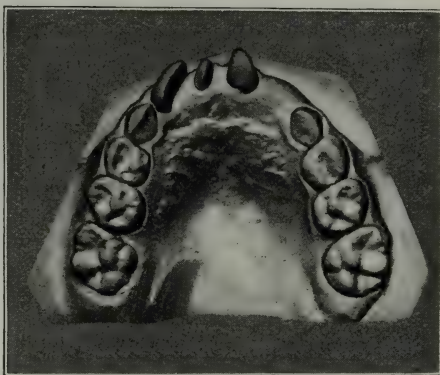
by a process of division or budding the protocone, the mesio-lingual cusp, gradually divides and gives off a hypocone, a disto-lingual cusp, without affecting the cingulum. In Fig. 9 is presented the occlusal aspect of an Eocene primate, *Notharctus*, a direct descendant of *Peliodon*. It must, however, be noticed that though the fourth cusp, the hypocone, is developed, the cingulum is still present, while in the *Pronycticebus* (Fig. 8) the cingulum as such is participating in the origin of the disto-lingual cusp.

#### DIFFERENCES IN OCCLUSION OF THE TWO TYPES OF HYPOCONE.

Also the occlusion of the two types of hypocone (disto-lingual cusp) is different. Thus, the *pseudo-hypocone* antagonizes the protoconid, the mesio-lingual

gual cusp of the lower trigonid (see Fig. 10), while the *cingulo-hypocone* is accommodated into the trigonid basin, the mesial fossa of the lower molar, as it occurs in man (see Fig. 11). That the anthropoid and human disto-lingual cusp of the upper molar belongs to the latter category may be verified by the frequent manifestation of the cingulo-hypocone continuity and by its manner of occlusion. Thus, Fig. 21 A, representing the occlusal aspect of the upper jaw of a modern gibbon, shows clearly in what a decided manner this feature may

FIG. 12.



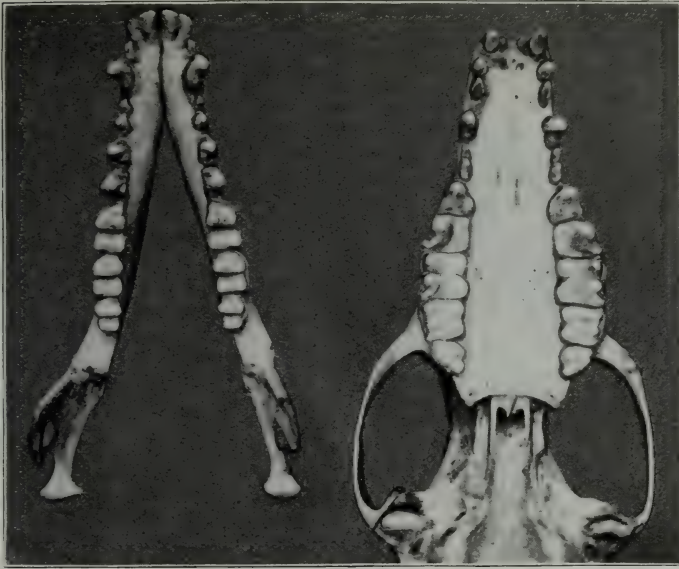
Cast of human upper dental arch, occlusal view; showing the cingulo-hypocone continuity in the second deciduous molars.

appear. It must, nevertheless, be understood that this continuity is not a constant manifestation in the gibbon, because the lingual groove quite often separates the anterior from the posterior half, probably giving rise to the Carabelli tubercle. But even in man the cingulo-hypocone continuity has been observed, as may be seen in the second deciduous molar, Fig. 12. In this illustration may also be observed the Carabelli tubercle in the first permanent molar as it appears upon the manifestation of the lingual groove.

#### FURTHER MODIFICATIONS OF THE LOWER MOLAR AND ITS EFFECT UPON OCCLUSION.

With the development of this fourth cusp the obliteration of the triangular

FIG. 13.



Upper dental arch of modern insectivore, *Gymnura*, occlusal aspect; showing extreme development of the square four-cusped molar, thereby obliterating completely the intermolar triangular spaces. Also position of metastyle may be seen in the point projecting behind the disto-buccal cusp. (*Amer. Mus. of Nat. History, New York.*)

interdental spaces between the upper molars occurs, and as indicated above a modification in the type of occlusion takes place. Thus, while the present mesio-lingual cusp (protocone) of the primitive trigone on the upper molar is still accommodated into the talonid basin (the central fossa of the lower molar), the disto-lingual cusp (hypocone) of the upper molar fits into that of the trigonid (the mesial fossa of the lower molar). The most extreme development of the quadrangular four-cusped molar and the complete obliteration of the intermolar spaces is found in *Gymnura*, an insectivore, Fig. 13.

*Pari passu* with the acquisition of these cusps, other modifications occur; namely, in the lower molar the levels of the two moieties, the trigonid and the talonid, become more uniform, eventually reaching the same plane, and the paraconid (the mesio-lingual cusp) of the original trigonid is lost. Thus, as early as in the primitive primate *Dryopithecus*,

FIG. 14.



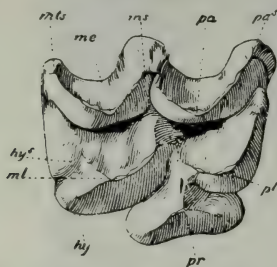
Drawing of dentition of *Dryopithecus*, a Pliocene ancestor of some of the anthropoids, showing the type of lower molar inherited by the great apes and man. (*After Gregory.*)

*theacus*, a Pliocene forerunner of some of the modern anthropoids, about 3,000,000



years ago, the lower molar pattern of the modern primates is already estab-

FIG. 15.



Upper right molar of horse, showing number and position of styles on the occlusal surface: *pr*, protocone; *pa*, paracone; *me*, metacone; *hy*, hypocone; the other letters indicate the styles. (After Osborn.)

lished (see Fig. 14). But it must be mentioned that although the trigonid

of the paraconid, the primitive form of occlusion is still retained. That even in modern man the primitive occlusal relations remain unchanged is illustrated in Fig. 11, representing the dentition of a white European male in occlusion as viewed from the lingual aspect. As this figure illustrates, the protocone (mesio-lingual cusp of the upper molar) is still accommodated in the talonid basin (central fossa) of the lower molar and the hypocone (the disto-lingual cusp of the upper molars) in the trigonid basin (mesial fossa) of the lower molar; the paraconid, of course, being absent.

#### BUCCAL VIEW OF MOLAR OCCLUSION.

Thus far occlusion has been traced from very remote times in several placental mammals, including man. The points, however, mostly emphasized in

FIG. 16.



Occlusal view of upper (A) and lower (B) dental arches of the puma, showing change in contour by the modification of the proto- and paraconids in the lower molar, and by the extreme development of the metacone metastyle shearing blade in the upper fourth premolar. (*Amer. Mus. of Nat. History, New York.*)

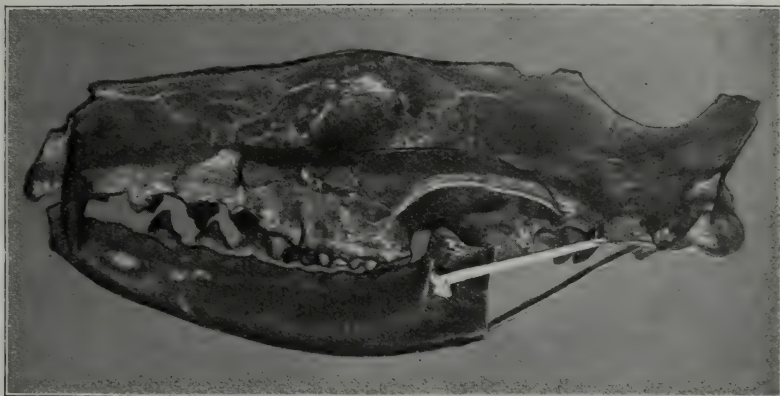
portion of the lower molar of the primates and man is modified by the loss

this relation, were the lingual cusps of the upper, and the fossæ on the occlusal



surface of the lower molars. As it has been shown, this phase in the evolution of molar occlusion is quite direct and the lingual occlusal aspect of the teeth remains unchanged. On the buccal side, however, a different set of conditions ap-

FIG. 17.

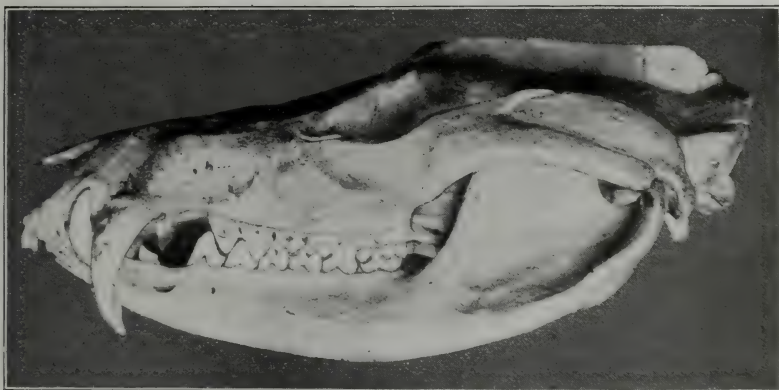


Buccal view of dentition of a primitive placental mammal (*Sinopa*), showing the indistinct manifestation of the occlusal relation of the molars. (*Amer. Mus. of Nat. History, New York.*)

constant. On the examination of the buccal aspect, however, factors make their appearance that render the mani-

pears, namely, besides the usual number of cusps there are certain accessory structures developed which in occlusion

FIG. 18.



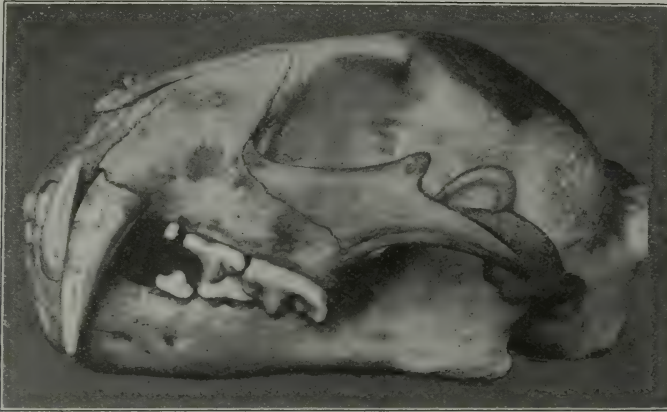
Buccal view of dentition of opossum, showing the same characteristics as that in Fig. 17. (*Amer. Mus. of Nat. History, New York.*)

festation of the occlusal relationship unclear. Thus, while certain lingual cusps appear (the hypocone in the upper molar) or disappear (the paraconid in the lower molar) in the course of evolution,

obstruct the view of the cusp relationship to such extent as to prevent a correct examination. Thus the styles appearing in the buccal region of the occlusal surface of the upper molars in the insecti-

vores and ungulates or the extreme changes in contour of the teeth in the tion they assume. Fig. 16 A and B illustrates the changes brought about in

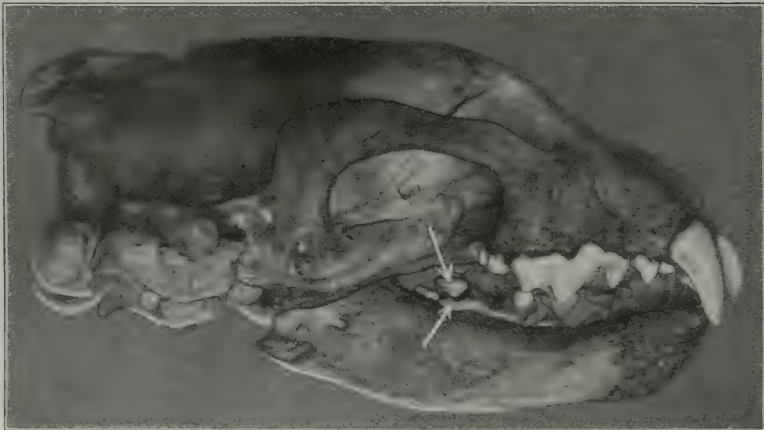
FIG. 19.



Buccal aspect of the dentition of the puma, showing the same manifestation as Fig. 17. (*Amer. Mus. of Nat. History, New York.*)

carnivores tend to modify the buccal aspect so as to render the perception of the occlusal relation inaccurate. Figs. the form of the teeth themselves in the *Felidae*. In this illustration (Fig. 16), showing the occlusal aspect of the denti-

FIG. 20.



Lingual aspect of the dentition of the *Gulo* (wolverine or gnut), one of the *Mustelidae*; showing the protocone of the upper molar being accommodated in the talonid basin (indicated by arrows). (*Amer. Mus. of Nat. History, New York.*)

5B, 13, 15 (*Sinopa, Gymnura* and horse) show clearly in what manner these secondary structures appear and the position of the puma. it may readily be seen to what extent the upper last premolar and lower first molar are modified by

their specialization and adaptation to a meat diet. These modifications, it must be repeated, both in the form of the

the buccal aspect as to the manner in which occlusion is perfected in the various placental mammals, both primi-

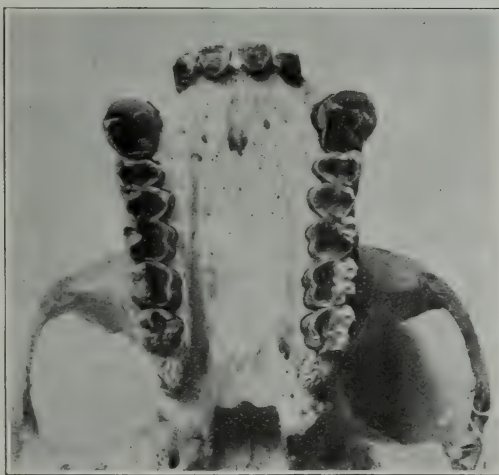
FIG. 21.



A



B



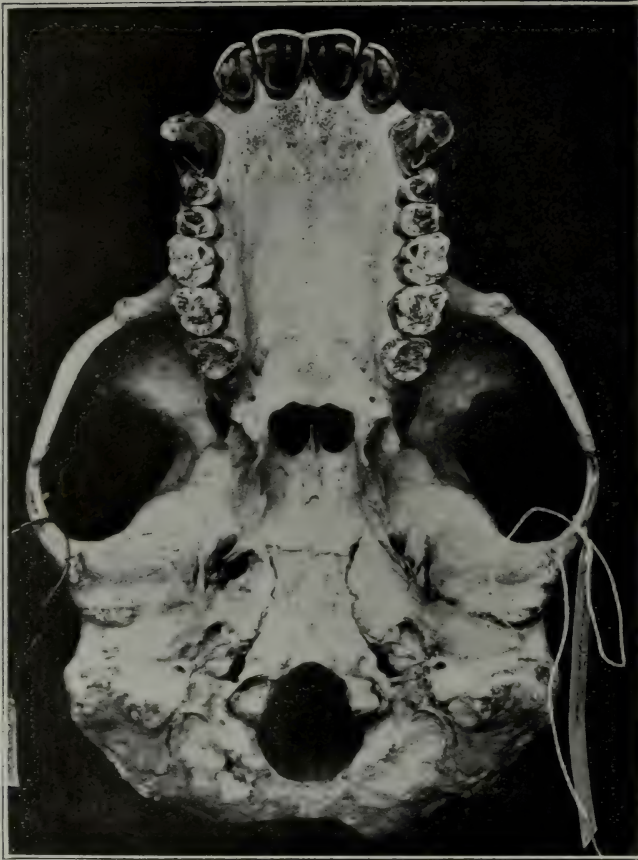
C

teeth themselves and in the addition of the accessory styles, in the upper molars, tend to prevent a clear perception from

tive and recent. Figs. 17, 18 and 19, representing the dentitions of *Sinopa*, *Gymnura* and *Puma* in occlusion as viewed from the buccal aspect, illustrate the point in question. And yet, even in the extremely modified forms of the carnivore teeth, the lingual view of occlusion will demonstrate the primitive features when the upper molars are present; as may be seen in Fig. 20, illustrating the lingual aspect of the dentition of one of the *Mustelidae*, the *Gulo*, (wolverine or glutton), the protocone is accommodated into the talonid fossa as is indicated by the arrows.

Another factor obscuring the true occlusal relation as viewed from the buccal aspect is the position of the upper molars with regard to their mesio-distal axes. Thus the three general types of molar are closely associated with certain peculiarities in the position of their mesio-distal axes as viewed from the occlusal aspect. For instance in the triangular type of molar teeth there is no lapping in the buccal aspect, for the styles occupying that region are evenly



FIG. 21.—*Continued.*

D

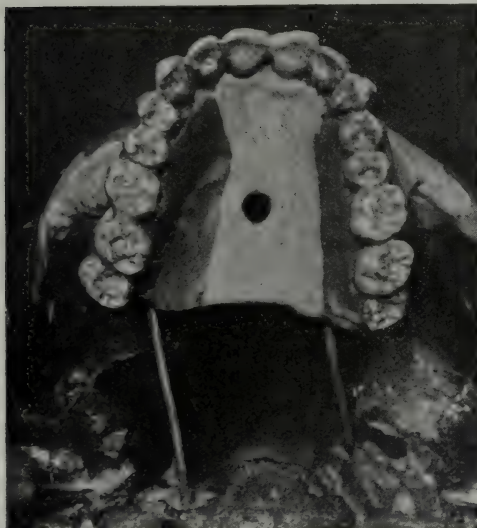
aligned on that surface (see Fig. 5). In the sectorial type one tooth laps behind the other (see Fig. 16 A and B), and in the quadritubercular type the mesio-buccal angle is more prominent buccally than the disto-buccal angle (Fig. 13). But, although in the primitive primates, anthropoids and man, such structures as styles do not appear nor are the teeth so modified as in the carnivores, the primitive quadrangular molar position is retained. This may be observed in Fig. 21 A, B, C, D and E, illustrating the upper dental arch of the gibbon, orang, gorilla, chimpanzee and primitive man; showing that although the form of dental arch varies extensively throughout these primate groups, the position of the molar

relative to the prominence buccally of the mesio-buccal angle is constant.

On the examination of 800 cases of malocclusion it is found that in a very high percentage of instances the upper molars are rotated. This rotation seems to occur in such a manner as to bring the buccal cusps into an even buccal plane with the rest of the teeth. This rotation seems to affect the position of the mesio-lingual cusp in such a manner as to influence its occlusion mesio-distally in a very slight degree, while the buccal cusp may at the same time appear in a decided malposition. It shows, therefore, primarily, that the pivotal point of rotation of the upper molar is in the region of the longitudinal axis of the

lingual cusp. And secondarily, it demonstrates that the effect of such deviation is to allow the mesio-buccal cusp to assume a more mesial position than that of the lingual cusp, thereby leaving the mesio-lingual cusp either entirely in its primi-

FIG. 21.—Continued.



E

Occlusal aspect of the upper dental arches of the gibbon (A), orang (B), gorilla (C), chimpanzee (D), and primitive man, *Homo-Musteriensis* (E), showing characteristic position of upper molar. The mesio-buccal angle is more prominent buccally than the disto-buccal angle. (A, B, C, *U. S. National Museum, Washington*; D, E, *Amer. Mus. of Nat. History, New York*.)

tive relation, or to move considerably less mesially than the buccal cusp. As a result it will be found that, excepting the decided Class II manifestations, in a great majority of so-called distal occlusion cases the mesio-lingual cusp of the upper molar will be more nearly in its primitive relation, while the buccal

cusps may definitely indicate a Class II deviation, as is shown in Fig. 1 B. This manifestation clearly indicates that the mesio-lingual cusp of the upper molar in its relation to the central fossa of the lower molar in occlusion is the last vestige of the primitive condition to be severed in the transition of the dentition toward abnormality.

One is, therefore, irresistibly forced to the conclusion that in view of the evidence adduced a uniform and definite decision as to a correct classification of occlusal anomalies can only be reached by revising the manner of procedure. This can be accomplished by the elimination of the buccal aspect of the cusp relationship and by the adoption in its stead of the lingual cusps of the upper molars and the occlusal fossæ of the lower molars. For it must be emphasized that these are the only reliable distinguishing features, because they are the most primitive landmarks of occlusion still retained in the dentition of man.

In the preparation of the above contribution, the following works have been consulted:

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GREGORY, WM. K., "Studies on the Evolution of the Primates." (*Bul. Am. Mus. of Nat'l Hist.* Vol. xxxv, Art. XIX.)

GREGORY, WM. K., "The Evolution of Orthodonty." (*DENTAL COSMOS*, May 1918.)

ANGLE, E. H., "The Malocclusion of the Teeth." 1907.

In addition to this, I most gratefully acknowledge the extensive information acquired through the kindness of Dr. Gregory for which I am greatly indebted to him.

40 EAST 41ST ST.

[See also *Discussion*, as reported under "Proceedings of Societies," this issue.]

## Vincent's Gingivitis.

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### INTRODUCTION.

GINGIVAL disease is probably one of the commonest ailments with which the civilized human race is afflicted. Due to our mode of living, our soft diets, irregularities of teeth, and probably "over-dentistried" mouths the gingival tissues have been so weakened that they easily fall a prey, at the slightest provocation, to any infective organisms that may be lurking in the oral cavity. But all diseases of the gums are not the same and the differential diagnosis of these various conditions is of the utmost importance, because what may be a beneficial treatment for one disease may be absolutely contra-indicated for another. The physician would not consider every severe pain in the region of the right side of the abdomen pathognomonic of appendicitis and immediately proceed to operate. He would go over the symptoms, make his eliminations and differential diagnosis and then arrive at his conclusions and treat the disease accordingly. Yet the average dentist calls every inflammation of the gingival tissue pyorrhea and straightway turns to his cabinet for his scalers and begins to operate.

He does not ask for symptoms, he does not make a differential diagnosis, he does not arrive at a scientific conclusion based on sound facts which he should have gleaned from his examination. The microscope never enters his mind. He was told that, if a patient presented himself with inflamed gums and a seemingly purulent discharge, the patient had pyorrhea alveolaris, and that scaling the teeth and removing the tartar

was the treatment. What if there is no tartar? What if this seeming discharge is not a discharge at all but a membranous covering?

There is one disease of the gingival tissue which dentists see and do not recognize but call it pyorrhea and treat it as such. They then wonder why they get no results, and why instead of the condition getting better it gets worse. In this disease the ordinary pyorrhea treatment is not only contra-indicated but is absolutely harmful. This condition of the gingiva is caused by the Spirochete Vincenti and the Bacillus fusiformis, and has been termed ulceromembranous gingivitis and Vincent's gingivitis. This latter term was suggested by Dr. Grieves and I think is a very appropriate name, as the organisms causing this condition are the same as those causing Vincent's angina.

### BACTERIOLOGY.

Direct smears from the pseudo-membrane are best for microscopical examination. These may be made either with the platinum loop, or a portion of the membrane may be lifted with sterile forceps and smeared over the slide. The smear is allowed to dry and is then fixed in the flame. It is next stained either with Loeffler's methylene-blue or dilute carbol-fuchsin. We find that the dilute carbol-fuchsin brings out the organisms better. The slide is now examined under the 1/12 oil immersion lens. Two organisms will constantly be seen, a delicate spirillum and a fusiform bacillus. Whether these are two distinct organisms or whether the bacillus and



spirillum are different stages in the development of the same organism is a disputed question among bacteriologists.

The *B. fusiformis* is an anaerobe and yields a fetid odor. It is from five to seven microns in length. It is Gram negative. There are two types of the bacillus, one rather slender, which, under the Giemsa stain, shows pale blue with maroon dots at either end, and the other thicker, staining uniformly maroon. At times aggregations of the fusiform bacilli give the appearance of branching, resembling very much the bacillus of diphtheria, but a knowledge of the characteristics of these organisms enables one to easily distinguish the two; the *B. fusiformis* being Gram negative, while the *B. diphtheriæ* is Gram positive. The diphtheria bacterium is club-shaped at the ends, while the *B. fusiformis* has attenuated ends. Then again the bacillus of diphtheria shows up most characteristically under the Neisser stain, its polar bodies being brought out very prominently, while the *Bacillus fusiformis* shows no characteristic polar bodies under this stain. Culturally the *B. fusiformis* has no characteristics. It is non-motile, although Stitt claims he has noted motility.

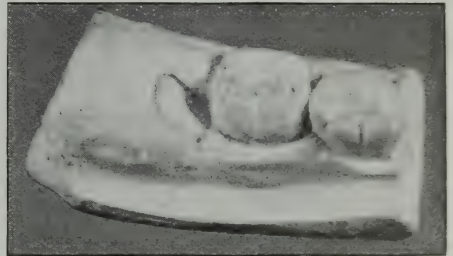
The Spirochete Vincenti is a delicate spirillum of from eight to ten microns in length. It shows up plainly under the ordinary stains and has never been cultivated. It must be differentiated from the *Treponema pallidum*. This can be done by using the dark-field microscope and referring to the other symptoms of the patient. In taking a smear from an ulcerated area in the mouth, symptoms of the patient must be closely gone over, and if there are any symptoms that are suspicious of syphilis we must not depend entirely on the dark-field microscope in eliminating the *T. pallidum*, but we must have recourse to the Wassermann reaction.

#### PATHOLOGY.

At some point of lowered resistance in the mouth, these organisms gain entrance into the tissues, incubate and mul-

tiply. A favorite site for these bacteria to start activity is under the flap of inflamed gum covering an erupting third molar, or in the pocket caused by an impacted third molar. The infection spreads from this *locus minoris resistentiæ* along the free margin of the gums, around the necks of the teeth until the whole mouth is probably involved. This infective process may extend backward to the soft palate, fauces, tonsils and pharynx, causing a severe angina with serious complications, and creating a condition that resembles diphtheria very closely. The gingiva becomes necrotic and the dead epithelial cells are

FIG. 1.



Type of impacted third molar forming pocket that may easily become infected and serve as a place of lowered resistance for a Vincent's infection to begin. In this case, instead of cutting out the pocket, it is best to remove the tooth.

thrown off, becoming enmeshed in a fibrinous exudate, and giving the appearance of a grayish membrane. This membranous appearance has led some authorities to call this disease ulceromembranous gingivitis. (See Fig. 1.)

These organisms have very little power to invade the tissues, and in this regard resemble very closely the bacillus of diphtheria. They do, however, lower the resisting powers of the tissues and make way for a secondary infection. In a true acute Vincent's gingivitis the soft tissues alone are involved and not the deeper alveolar structures, and there is no pus formation. Where pus is formed and the alveolar process is attacked and destroyed, secondary infection by pyo-

genic organisms has taken place. Vincent's gingivitis occurs only in the acute form, and has no chronic stage as Dr. Grieves claims. Where pus and alveolar destruction take place we have a true pyorrhea and not a Vincent's gingivitis. But this pyorrhea might have had its inceptive stage in an acute Vincent's gingivitis, which being unrecognized and neglected made way for a secondary in-

the field will show not only the spirillum and bacillus, but various forms of other bacteria with the spirillum and bacillus in the vast minority. This field will be such that if submitted to a bacteriologist, he or she would not recognize nor diagnose the smear as one coming from a case of Vincent's angina. Surely a case whose microscopical picture does not present the characteristics of a certain dis-

FIG. 2.



(Magn. 1200.)

Smear taken from a case of Vincent's infection. Note almost entire lack of presence of other organisms than those of Vincent's.

vasion by the pyogenic organisms with a resultant pyorrhea. Many a case of pernicious pyorrhea has started with an attack of Vincent's gingivitis, which was neglected, or, if not, was not recognized and not treated properly.

If a smear is made from a true case of Vincent's gingivitis, the spirillum of Vincent and the *Bacillus fusiformis* will be found to the almost total exclusion of all other forms of organisms, but if a smear is made from a case of pyorrhea

case cannot be called a chronic form of that disease. (See Figs. 2 and 3.)

In Vincent's gingivitis the patient shows symptoms of an accompanying toxemia. While the organisms of Vincent, as has been said above, do not deeply invade, they secrete a toxin that gains entrance into the system. Another peculiarity of this disease is that it is found most frequently in the mouths of people between the ages of twenty and thirty. It also occurs in epidemic form

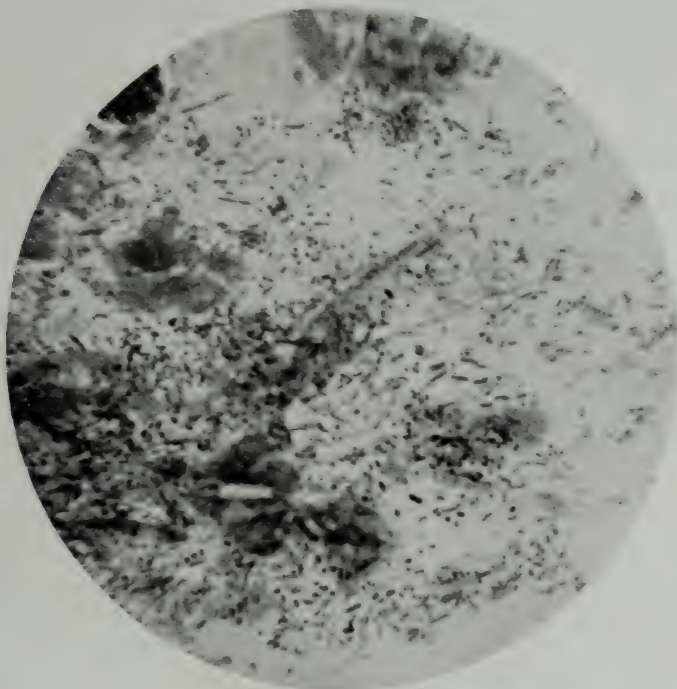
and is infectious. It may be transmitted by using the same toothbrush or eating utensils, and kissing.

#### CLINICAL SYMPTOMS.

The mouth shows marked gingival congestion. There is a distinct line of demarcation between the inflamed and

covered with a thin bloody discharge. The saliva is of a thick mucoid character. The patient complains of pain in the mouth, with difficulty in swallowing, and suffers from a general malaise, feeling weak and listless. There is a rise in temperature varying between 100° and 102° F. The blood examination shows a slight leucocytosis. (See Fig. 4.)

FIG. 3.



(Magn. 1200.)

Smear taken from a case of pyorrhea. Note variety of organisms found. Note also the difference between this picture and one showing the smear from Vincent's infection.

normal gum. The gum margin presents a necrotic and ragged appearance and is covered with a dirty grayish pseudo-membrane. The buccal and labial surfaces are usually involved, but rarely the lingual and palatal surfaces. Both jaws are affected simultaneously. The gums bleed at the slightest provocation. The glands in anatomical relationship become involved. Some cases are accompanied by marked salivation, especially at night, the patient finding the pillow

#### DIFFERENTIAL DIAGNOSIS.

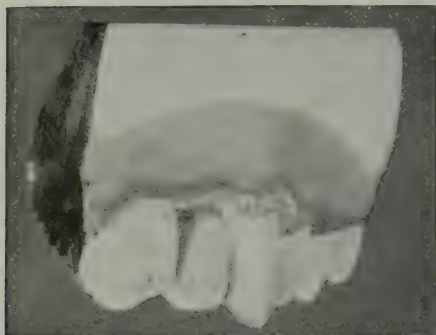
Of the utmost importance is the correct diagnosis. We must differentiate a Vincent's gingivitis from a plain catarrhal gingivitis, or traumatic gingivitis.

True Vincent's gingivitis is painful, while the other forms of gingivitis and pyorrhea are rarely so. There is also glandular involvement which is not present in the other conditions. The pseudo-membrane is of course distinctly char-



acteristic. The symptom of marked salivation in some cases is another fea-

FIG. 4.



Model showing a Vincent's gingivitis. Note gingival congestion and ulcero-membranous area over lateral and cuspid. Also the distinct demarcation between the inflamed and normal tissue.

ture rarely present, and if present at all it is only to a small degree, in the other forms of gingivitis and pyorrhea. The general malaise accompanying a Vin-

#### *Vincent's Gingivitis.*

Pain.  
Pseudo-membrane.  
Glandular involvement.  
Salivation (especially at night).  
Malaise.  
Bacteriological examination.

#### *Vincent's Gingivitis.*

No *Treponema pallidum* found.  
Negative Wassermann.

#### *Vincent's Gingivitis.*

Vincent's organisms found.

Wassermann reaction. Of course Vincent's infection may be secondary to a syphilitic lesion in the mouth. In this case we would treat the Vincent's locally, using probably applications of salvarsan, and have the syphilis treated systemically.

If the Vincent's infection should spread to the throat its general appearance is that of a diphtheritic infection. Here we must depend upon our bacteriological examination to make our diagnosis. If the membrane is diphtheritic we will find the Klebs-Loeffler bacillus and also have distinct characteristics on Loeffler's blood-agar. We may again have a diphtheritic infection concomitant with a Vincent's angina. The treatment is prescribing mouthwashes and gargles locally, and administering diphtheritic antitoxin injections. In the last two cases we must have the co-operation of the physician, although the diagnosis has frequently to be made by the dental surgeon first.

The following scheme may be useful in distinguishing Vincent's gingivitis from diseases that resemble it:

#### *Other Forms of Gingivitis and Pyorrhea.*

No pain.  
None.  
None.  
Not noticeable.  
Rarely any.

#### *Syphilis.*

*Treponema* found under the dark-field microscope.  
Positive Wassermann.

#### *Diphtheria.*

Klebs-Loeffler bacillus found.

cent's infection of the gums is not commonly found in the other conditions. Bacteriological examination will confirm the diagnosis.

Vincent's gingivitis must also be distinguished from syphilis in the mouth. We can make our diagnosis from the other symptoms of the patient and the use of the dark-field microscope and the

The treatment of this disease seems to be a much disputed question. Some claim that the use of drugs alone is indicated, others claim that mild instrumentation is needed. The one outstanding fact, however, is that the mouth must be antisepticized. How this is done

#### TREATMENT.

depends entirely upon the wisdom of the operator. During the first days of the acute attack instrumentation of any kind is certainly not indicated, for two reasons, one that we are liable to cause deeper infection, and the other because the patient's mouth is in such a painful and troubled condition that he would not be able to stand any manipulations about the gums.

Vincent's gingivitis is readily amenable to proper treatment. From clinical observations the organisms seem to be easily destroyed by any of the more common oral antiseptics. Some operators recommend oxygenation of the tissues, others suggest a mild acid, and still others use a spirillicide, such as salvarsan. All these methods of treatment seem to have the proper effect.

The treatment we have found most efficient is an intensive one. The patient is seen at least once a day. If the case is severe we see the patient more often. The mouth is swabbed with sterile gauze or cotton and as much as possible of the membranous exudate is wiped away. The interdental spaces are flushed out with a strong syringe charged with physiologic salt solution. Then the inflamed areas are painted with Churchill's iodine. A mouthwash is prescribed, to be used at least every two hours. We suggest either a saturated solution of potassium chlorate, or one that we have used with quite some success, which is composed of:

Liquor potassii arsenitis . . . . . 1

Liquor antisepticus alk. . . . . 3

*Sig.* One teaspoonful in half a glass of water.

The patient is also instructed to take a thorough purge and to keep on a light diet. If there is an infected flap in the third molar area a thin piece of iodoform gauze is packed under it. This gauze acts as a drain. The patient is seen again in at least twenty-four hours and the above local treatment is instituted. When the acute condition has subsided and the patient is in a more comfortable state gentle instrumentation may be resorted to. By gentle instru-

mentation we mean just what the words imply. Do not go deeply into any pockets, or abrade the gingival tissue in any way, thus opening avenues for secondary infection. All supra-gingival tartar can be gently removed, together with any débris that may be lying in the gingival trough. This scaling, together with the use of antiseptics, accomplishes both mechanical and chemical cleanliness of the parts, and raises the tone and vitality of the tissues. By ordering the patient to take a strong cathartic and to live on a light subsistence diet we help the system generally in eliminating any toxins that may be absorbed.

After we have succeeded in combating the acute symptoms and the tissues are again returning to normal we must guard against reinfection. Any area that may serve as a place of lowered resistance must be removed. One of the commonest sites, as was said before, for infection to begin is under and around the flap of gum overlying an erupting or impacted third molar tooth. This is best done under conduction anesthesia. Infiltration anesthesia must not be used for fear of causing deep infection. As most of these infected flaps overlie lower third molar teeth, the mandibular injection is most often used. It is well here to review briefly the technique of the mandibular injection and describe the operation for the removal of these infected flaps.

#### ANESTHESIA.

The external oblique is palpated and the finger is turned mesially until the ball of the finger lies in the retro-molar triangle and the edge of the finger-nail touches the internal oblique line. The point of injection is painted with Churchill's iodine. The needle is inserted about 1 cm. above the occlusal plane of the lower molars and approximately in the center of the triangle. When we strike the bone we retract a little and pass the internal oblique line, here injecting a minim or two to catch the lingual nerve. We must at all times be sure to keep in close proximity with the



bone. When we have approximately reached the inferior dental foramen the contents of the syringe are discharged. About one cc. of a two per cent. solution of novocain-suprarenin is used. This quantity is sufficient as we are operating near the site of injection, and, as we do not need the entire inferior dental nerve anesthetized, we do not have to depend upon a large amount of solution to get conduction along the whole nerve trunk.

After anesthesia is complete, the flap is grasped with a pair of rat-tooth forceps and with curved scissors or a curved bistoury is severed as near its connection as possible. The exposed portion of the tooth is sealed and cleaned and the pocket is curetted. The wound is painted with Churchill's iodine and a piece of iodoform gauze placed over it. The patient is instructed to keep the mouth very clean. In from forty-eight to seventy-two hours the wound is, in most cases, entirely healed, and one would not recognize that a flap had ever existed.

After every possible chance for future reinfection has been removed, the teeth are given a thorough prophylactic treatment, all deeply seated tartar is removed and the teeth are polished. The patient is instructed in oral hygiene and is seen every month for three months for prophylaxis. After this period the patient is seen every two or three months in order to watch the condition of the mouth.

Under the form of treatment that we have just outlined, we have had uniform success with all the cases that have come under our care. By the intensive treatment during the acute stage we have been able to bring about the subsidence of all the distressing symptoms in five or six days, which under the less vigorous methods of treatment would have taken from two to three weeks.

#### CONCLUSION.

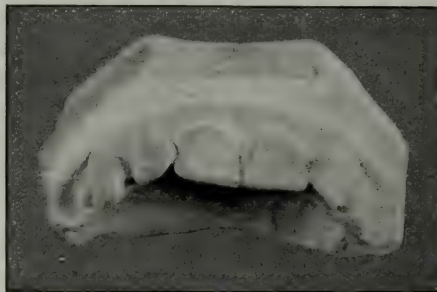
In conclusion we can say that Vincent's gingivitis is more common than is ordinarily believed, only it is not recognized. A correct diagnosis based upon both clinical and bacteriological examination must be arrived at. If recog-

nized in time, that is before secondary infection sets in, this disease is easily cured. Finally let us plead for the more frequent use of the microscope and the bacteriological laboratory by the dentist.

#### REPORT OF TWO CASES.

*Case 1.* Miss S., age twenty-four. First felt a slight uneasiness about erupting lower right third molar. Gradually this condition became worse until severe pain set in. The gums were sore and bled easily and the patient felt ill. The symptoms became worse about four o'clock in the afternoon. There was marked salivation, especially at night, and upon arising in the morning she found her pillow covered with a bloody discharge. There was also difficulty in swallowing.

FIG. 5.



Model taken from a case recovered from a Vincent's gingivitis. Note normal appearance of gingival margins, which at onset of the disease were attacked. This model was taken from case described under *Case 1*.

Upon examining her mouth we found the gum flap covering the lower right third molar, which was just erupting, badly inflamed. There was marked gingival congestion extending over the whole mouth, and around the anterior teeth in both jaws were ulcerated areas covered with a grayish membrane. The sublingual and submaxillary glands on the right side were enlarged. The throat was inflamed, but there was no membranous covering. The patient's temperature was 101° F. A smear was taken from the membrane and examined. The microscopical picture showed a true Vincent's infection.

The patient's mouth was swabbed and irrigated with normal saline solution. The ulcer-



ated areas were then painted with Churchill's iodine. The mouthwash prescribed as above, a light diet, and a cathartic were ordered. This treatment was again repeated in twenty-four hours. The patient felt somewhat relieved. By the end of a week the acute symptoms had subsided. The teeth were gently scaled and under a mandibular anesthesia the flap of gum over the lower right third molar tooth was removed. In two weeks the patient's mouth was quite normal. The teeth were then given a thorough scaling and polished. It is now six months since the attack set in and there has been no recurrence of the disease. (See Fig. 5.)

*Case 2.* Mr. S., age twenty-six, ensign U. S. Navy. Gums felt very sore and bled profusely upon the slightest irritation. Went to a dentist, who diagnosed the trouble as pyorrhea. The dentist scaled his teeth and then brushed them with an engine brush and pumice; the patient was then discharged as cured. This manner of treatment naturally did not improve the condition and the patient

felt worse after seeing this dentist than before. He was then referred to us.

When we saw him his mouth was in a sorry state. His gums were badly inflamed and there were ulcerated areas around the upper lateral and cuspid teeth and also around the lower anteriors. There was an infected pocket back of the lower right third molar. The ulcerated area in the lower jaw, instead of involving only the gingiva, extended to almost the muco-buccal fold.

As much of the membrane as possible was wiped away and the mouth irrigated. The ulcerated areas were painted with Churchill's iodine. A mouthwash of a saturated solution of potassium chlorate was prescribed, together with a cathartic. The diet was also regulated. The patient was again seen in eight hours for treatment. In a few days the patient felt well enough to return to duty, and by the end of two weeks was ready to sail South with his ship, his mouth being entirely well.

895 WEST END AVE.

## Amalgam Tooth-filling Removed from Lung After a Seven Months' Sojourn: Case Report.

By W. W. KEEN, M.D., LL.D., F.A.C.S., CHEVALIER JACKSON, M.D.,  
F.A.C.S., and WILLIAM H. SPENCER, M.D., Philadelphia, Pa.

**A** MAN, age forty-nine years (case No. 716), was referred because of severe cough, purulent expectoration, loss of weight and strength, and the knowledge of the presence of a foreign body in the right lung. He had never been in robust health, and had suffered frequent periods of insomnia when the strain of business became excessive. For the insomnia he had received treatment at the hands of many physicians and in many health resorts. During one of the periods of sleeplessness the attending physician advised the removal of several teeth, which a radiograph had shown to have abscesses about the roots. Seven months before admission, follow-

ing the direction of the physician, six teeth were extracted under gas anesthesia without apparent incident. A day or two after the extraction a moderate cough developed, and two weeks later there occurred a febrile attack associated with paroxysms of coughing which, in the presence of an epidemic, was diagnosed influenza. The cough became more severe, and an increasing amount of sputum was expectorated as the winter progressed. A change of climate was prescribed, and the patient spent the winter in Florida. The cough, however, became more and more annoying, and the general health much affected. Sputum examinations were repeatedly

negative for tubercle bacilli, and a course of vaccine made from the sputum was given without benefit.

On returning North further complete examinations were made. The blood and spinal fluid Wassermann tests were negative, and no tubercle bacilli were found in the lung secretions. The pa-

general surgeon, who failed to find the foreign body. The patient was now advised to have the object removed by incision through the chest wall; but he refused thoracotomy. The sputum became blood-tinged following the bronchoscopies and amounted to about four ounces daily; the cough became so severe as to

FIG. 1.



Radiograph of chest showing amalgam tooth-filling in lung tissue at the level of the diaphragm.

tient had lost about twenty pounds. The sputum two months previously had become purulent; its odor and taste had caused an anorexia, and sometimes produced vomiting. A radiograph of the chest now made showed a metallic foreign body in the right lung just above the dome of the diaphragm.

The patient was sent to a hospital in a neighboring large city, where two bronchoscopies were done by a skilful

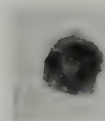
prevent sleep, the loss of strength was marked, and the patient stated that he was going "down hill" rapidly.

Examination on admission showed a poorly nourished, nervous, adult, white male. There was a loose persistent cough, productive of a brownish foul-odored sputum. No asthmatic wheeze was elicited. An intense laryngotracheitis was present with patches of exudate on the anterior tracheal wall. Examina-

tion of the lungs revealed limitation of expansion of the lower right chest. The percussion note on the whole right side was of a muffled resonant quality. The breath sounds were harsh and blowing, with prolonged expiration on the right side, and tubular in character to the right of the spine between the levels of the seventh and ninth dorsal vertebrae. In the area last mentioned there were heard loud snapping and snoring râles.

The radiographic report of Dr. Willis F. Manges reads as follows: "There is a metallic foreign body in the lower lobe of the right lung. It has the shape and size of a gold tooth crown. It is about two and a half inches to the right of the median line, on a level with the upper border of the eleventh rib, and lies in the

FIG. 2.



Amalgam tooth-filling removed from the lung tissue of the right lower lobe.

portion of the lung which dips down between the diaphragm and the posterior chest wall. In the lateral view the foreign body seems to be lying on the diaphragm on its posterior aspect, and is just back of a line drawn through the center of the vertebral bodies, so that it is very close to the posterior chest wall."

Under local anesthesia in Jefferson Hospital a bronchoscopy was done, and pus was seen coming up from a number of small bronchi. The foreign body could be felt with the forceps 38 cm. from the upper incisor teeth, but could not be separated from the surrounding tissues. At this level there is no bronchus of sufficient caliber to contain a foreign body of this size. It was thought best to wait for further suppuration to free the foreign body from the tissues. Three weeks later a second bronchoscopy was done under local anes-

thesia. Directed by seeing pus exuding from a small median branch of the right lower lobe bronchus, the forceps were inserted and were felt to be in contact with a metallic substance which was grasped and withdrawn. Time required, twenty-three minutes and thirty-nine seconds.

No reaction followed the bronchoscopy, and the patient was discharged from Jefferson Hospital the same day in good condition. A slight dry pleurisy developed on the day following the operation and remained for four days. After a stay of one month in the country the patient wrote that his cough had left; there was no discomfort in the chest, he had gained ten pounds in weight, and was returning to vocational duties.

*Comment.* This history well exemplifies the lesions and symptoms resulting from the prolonged retention of a foreign body of metallic nature in the lung. There is first a period of no symptoms, followed by progressively increasing cough, with an increasing quantity of sputum which finally becomes purulent, with the formation of a definite lung abscess. Hemoptysis occurs when the ulceration opens a vessel. If the vessel be of sufficient size copious hemorrhage may result. The septic process soon undermines the general health; there occur loss of weight, loss of strength, fever, anorexia, and circulatory disturbances. In many cases the resemblance to pulmonary tuberculosis is so striking that climatic and sanitarium treatment are carried on until, because of not finding tubercle bacilli in the sputum and usually as a final diagnostic aid, a radiograph is made and the cause of the disturbance is found to be a foreign body in the lung. Removal of the foreign body, even after extensive pathologic processes in the lung, in almost all of the cases results in recovery of general health. The recuperative power of the damaged lung is often remarkable, for in some cases in which lung abscess, secondary to a foreign body, has existed for extended periods, radiographs taken one year following the removal of the intruder showed perfect aeration; in



fact, it was almost impossible sometimes to tell on which side the lesion had been located.

General anesthesia is always attended with some degree of risk, not the least of which is the aspiration of foreign substances; these may be blood, pus, or other fluids, or they may be solids, such as fragments of bone, teeth, fillings, tissue, or small instruments. It should be the constant care of the anesthetist to prevent such accidents, and to keep the airway free. Intratracheal anesthesia is being quite extensively used for prolonged operations on the head and neck, and has proved itself an invaluable addition to the technique of such work. With intratracheal anesthesia it is impossible for fluid foreign substances to enter the trachea because of the backflow of air from the lungs; the presence of the catheter in the larynx protects it from the entrance of solid foreign bodies. With the shorter anesthesia produced by nitrous-oxid and oxygen, in which a face mask alone is used, special care must be exerted to prevent an accident. It might be useful to insert a piece of fluffed loose-mesh gauze into the mouth before beginning tooth extractions. Such a procedure would occupy but a few seconds and might be an effective preventive. It is needless to mention that in many cases the anesthetic itself is blamed as the cause of the lung condition, ether pneumonia and bronchitis being not unknown to the laity.

The aspiration of foreign bodies during general anesthesia is an accident occurring in but a very small percentage of cases. The fact that such a danger exists should, however, make us ever alert to guard against its occurrence. It was but recently that one of us was called to the operating-room because an anesthetist, having etherized the patient with the cone in the usual manner, found it impossible to introduce the intratracheal catheter into the larynx. His difficulty was found to be the result of the lodgment in the larynx of a piece of rubber tubing which had, unnoticed, slipped off the jaws of the mouth gag.

Sir St. Clair Thomson\* reports in detail the very interesting history of a patient who had aspirated a tooth during extraction under general anesthesia. The article is very instructive from the point of diagnosis, the difficulties encountered, and the excellent recovery. It should be read by everyone interested in these problems.

Thoracotomy for the removal of foreign bodies from the lung is an operation attended with high mortality and morbidity. The route through the chest wall is an operation which should not be advised until bronchoscopic removal has failed in the hands of at least two skilful bronchoscopists.

#### COMMENT BY DR. KEEN.

To any general surgeon, such as myself, the statement that a foreign body was situated in the lung 38 cm. from the teeth (that is within 2 cm. of the distance from the teeth to the cardiac opening of the esophagus), and still worse that it lay behind the dome of the diaphragm on the right side, would at once suggest an inevitable posterior thoracotomy in order to extract it. An inspection of the X-ray picture would absolutely confirm him in the hopelessness of its removal by bronchoscopy.

But the recent development and extension of bronchoscopy, especially by Dr. Chevalier Jackson, has made possible the seemingly impossible. Had I not personally witnessed his extraordinary success I would have been sképtical. His recent publication of an analysis of 628 cases in which he has removed foreign bodies of all kinds and in many different situations shows that the mortality is practically *nil*.

In the present case a small foreign body, one-quarter inch by one-quarter inch, had lain in the lungs for over seven months, and had caused very serious illness. It was successfully reached and removed. With its removal all symptoms

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\* *Proceedings of Royal Society of Medicine, Section of Odontology, July 1918, p. 100.*

quickly abated and the patient soon recovered his health.

There can be no comparison between bronchoscopy, which has practically no mortality, and the serious dangers attending a posterior thoracotomy, even with modern aseptic precautions, and in the hands of the most skilful surgeon. I am not aware of any extensive statistics dealing with the mortality of posterior thoracotomy for foreign bodies in the lung, but there can be no doubt as to the general fact that the latter operation *has* in fact a serious mortality.

Every surgeon, and for that matter,

every physician, should familiarize himself with Jackson's latest paper\* which shows the remarkable development of the surgery of foreign bodies in the air-passages—a paper which would cheer my old professor of surgery, Samuel D. Gross, whose work on this very subject (1854) still stands pre-eminent in American surgery.

1830 SOUTH RITTENHOUSE SQ.

\* Jackson, Chevalier. "Observations on the Pathology of Foreign Bodies in the Air and Food Passages." *Surgery, Gynecology, and Obstetrics*, March 1919, pp. 201-261.

## Report of an Examination Made of Two Thousand One Hundred and One High School Pupils.

By THADDEUS P. HYATT, D.D.S., New York, N. Y.

DENTAL DIRECTOR OF METROPOLITAN LIFE INSURANCE CO.

AT the request of the Physical Director of the Girls' High School, Brooklyn, N. Y., twenty-one dentists made an examination of two thousand one hundred and one girls.

Each pupil was provided with two charts upon which had been written her name, age, and grade. Ten to fifteen girls lined up behind each chair and as each girl stepped up to take her seat she handed her charts to the recorder who slipped a carbon paper between them so that a duplicate copy could be made. The duplicate copies were retained by the Physical Director and the other given to the pupils to take to their dentists, so that the location of each cavity might be known at once and much time saved. (See Chart.)

By the use of this chart any high school boy or girl can be taught in a few minutes to record the findings of the dentist as he examines the mouth.

The teeth are called off by number, giving location of cavity or if tooth is missing. By having each circle represent one tooth, and the right side of each circle always representing the mesial surface, and the left side of each circle representing the distal surface, much confusion is avoided. In the beginning of our work (we have examined upward of six thousand children) many mistakes were made by the children forgetting to change the mesial and distal surfaces on the right and left side of the chart. A chart should be made to read and not to picture the human mouth.

From records made of over six thousand children it is found that the average time needed to record missing teeth, location of cavities and mouth condition as to cleanliness is about two minutes per child.

This study is confined to loss of first molars and second premolars and loca-

tion of cavities in first molars. Thirteen were lost, or a total of two hundred and and one-half per cent. of all first molars thirteen.

CHART.

THE ADVISORY COUNCIL ON ORAL HYGIENE

TO THE

DIVISION OF EDUCATION ON HYGIENE OF THE DEPARTMENT OF EDUCATION

NEW YORK CITY

RIGHT

1

2

3

4

5

6

7

8

9

10

11

12

13

14

15

16

DENTAL

BUCCO-LABIAL

LINGUAL

UPPER

17

18

19

20

21

22

23

24

25

26

27

28

29

30

31

32

DENTAL

BUCCO-LABIAL

LINGUAL

LEFT

16

15

14

13

12

11

10

9

8

7

6

5

4

3

2

1

MESIAL

BUCCO-LABIAL

LINGUAL

Name

Address

Age

Grade

Missing 3 - 14 - 19 - 30

Decay 3 - 14 - 19 - 30

Total Number of Cavities

Total Number Teeth Missing

Teeth Irregular

Clean Fairly Clean Not Clean

SYMBOLS

O - Cavity

+ - Missing

• - Badly Decayed

R<sup>t</sup> - Roots

were lost, or a total of one thousand one hundred and forty-one. Two and one-half per cent. of the second premolars The following tables tell the story of the missing first molars and second premolars according to ages:

TABLE SHOWING TOTAL OF FIRST MOLARS LOST.

\* When the number is less than 100 a percentage is of little value.

Number of Girls.	Age.	Number of first molars missing.	Percentage.*
12	12	3	
220	13	113	13
605	14	334	13
522	15	304	14
370	16	206	14
250	17	120	12
91	18	39	
24	19	18	
7	20	4	
2101		1141	13½

TABLE SHOWING LOSS OF UPPER FIRST MOLARS.

12	12	0
220	13	25
605	14	85
522	15	64
370	16	60
250	17	34
91	18	11
24	19	5
7	20	0
2101		284



TABLE SHOWING LOSS OF LOWER FIRST MOLARS.

<i>Number of Girls.</i>	<i>Age.</i>	<i>Number of first molars missing.</i>	<i>Percentage.</i>
12	12	3	
220	13	88	
605	14	249	20
522	15	240	23
370	16	146	20
250	17	86	
91	18	28	
24	19	13	
7	20	4	
2101		857	

TABLE SHOWING LOSS OF SECOND PREMOLARS.

12	12	6
220	13	32
605	14	54
522	15	45
370	16	46
250	17	21
91	18	7
24	19	2
7	20	0
2101		213

TABLE SHOWING LOSS OF UPPER SECOND PREMOLARS.

12	12	1
220	13	9
605	14	13
522	15	23
370	16	21
250	17	5
91	18	2
24	19	0
7	20	0
2101		74

TABLE SHOWING LOSS OF LOWER SECOND PREMOLARS.

12	12	5
220	13	23
605	14	41
522	15	22
370	16	25
250	17	16
91	18	5
24	19	2
7	20	0
2101		139

These tables show that three times the number of the lower molars are lost as compared with the upper molars, and twice the number of lower premolars are lost as compared with the upper ones.

Comparing the losses on the right

side of the mouth with those on the left side, we find a larger number lost on the upper right side and a larger number lost on the lower left side. This applies to the premolars as well as to the molars.

The following table shows loss of first molars and second premolars according to location:

Upper right first molars .....	146
Upper right second premolars ..	42
Lower right first molars .....	409
Lower right second premolars ..	66

The high school course is four years, and is made up of eight half-year terms. There are two classes graduated

Upper left first molars .....	138
Upper left second premolars ...	32
Lower left first molars .....	448
Lower left second premolars ...	73

In studying the location of cavities in the first molars one is struck by the much larger number found in the occlusal surface as compared with all other surfaces. Roughly speaking we find the occlusal cavities are three times as many as the buccal cavities, five times as many as the mesial cavities, seven times as many as the distal cavities, nineteen times as many as the lingual cavities, and more than double the number of all

each year and new pupils enter the school in September and February.

Almost one-half of the total number of cavities in all the teeth of the pupils were found in the mouths of the seven hundred and sixteen girls who entered in September 1919. There were two thousand five hundred and eighty-eight cavities, or an average of 3.61 cavities per girl. Of the remaining one thousand three hundred and eighty-five girls there

TABLE SHOWING PERCENTAGE OF CAVITIES IN THE DIFFERENT SURFACES OF THE FIRST MOLARS.

	<i>Buccal.</i>	<i>Lingual.</i>	<i>Mesial.</i>	<i>Distal.</i>	<i>Occlusal.</i>
Upper right first molar .....	4.5	0.7	2.0	1.6	15.0
Upper left first molar .....	5.0	0.9	2.4	1.6	14.7
Lower right first molar .....	4.7	0.5	2.8	2.0	15.0
Lower left first molar .....	6.5	0.6	1.8	2.0	12.5

cavities in all other surfaces added together.

This certainly should receive the attention of all dental organizations, local, state and National, and of every dental college in the country, for the reason that prevention of such cavities is both simple and possible.

These figures have been secured in the following way: The total number of buccal surfaces is ascertained, also the total number of buccal surfaces having cavities. The percentage is then worked out from these two figures.

Taking the total number of cavities in all surfaces of the first molars and finding the percentage of each in relation to the total we have the following table:

was an average of 1.09 cavities per girl, or a total of two thousand five hundred and ninety-seven cavities.

TABLE SHOWING AVERAGE NUMBER OF CAVITIES PER GIRL ACCORDING TO GRADE.

First Grade	{ A—3.61 B—2.27
Second Grade	{ A—2.06 B—2.11
Third Grade	{ A—2.01 B—1.38
Fourth Grade	{ A—1.19 B—1.44

In March 1919 a dental examination had been made by the same dentists, and the results tabulated. Miss C. M. Wol-

	<i>Total number of</i>	<i>Percent.</i>
Buccal cavities .....	375	20.9
Lingual cavities .....	52	3.0
Mesial cavities .....	169	9.5
Distal cavities .....	137	7.6
Occlusal cavities .....	1057	59.0
All cavities .....	1790	100.

laston and her assistants gave talks to the girls upon the importance of early attention to the teeth. A large majority of these girls took their slips and visited the dentist and had the necessary work done. This accounts for the fact that one thousand three hundred and eighty-five girls had only nine more cavities than the new class of seven hundred and sixteen.

An interesting fact was brought out by the examination in March. A study by rooms was made, and in the room having the highest average number of cavities per girl, it was found that every girl had failed to pass her last examination.

One of the sad facts brought out in this work is the stupidity or ignorance of a large number of men carrying the degree of D.D.S.

Every man making the examination recorded cavities about which there could be no doubt. Many of the girls returned to the Physical Director and told her

that their dentist said the cavities were too small to fill, and they should wait until the cavities were larger. At first one might be inclined to think the girls made up these stories so as not to have the work done, but the same information is brought to me by too large a number of the employees of the Metropolitan Life Insurance Company, to doubt that there is much truth in what they claim their dentist tells them. Comments are unnecessary.

The co-operation of Dr. Dublin, Statistician of the Metropolitan Life Insurance Company, Miss C. M. Wollaston, Physical Director Girls' High School, and Drs. H. Bade, F. W. Buckley, F. Clayton, H. C. Croscup, J. D. Cook, R. H. Clark, C. H. Dunlap, W. N. Frazer, C. H. Feingold, E. H. Holbrook, O. S. Long, W. H. Mork, E. C. McGraw, J. L. Peters, T. O. Peterson, W. H. Rogers, V. A. Stoltz, J. D. Taylor, C. B. Whitecomb, P. N. Williams, W. T. Van Winkle, has made possible the presentation of this report.

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## CORRESPONDENCE

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### “Dental Legislation for the Elimination of Malpractice in Dentistry.”

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TO THE EDITOR OF THE DENTAL COSMOS:

*Sir*,—In the September issue of the DENTAL COSMOS there appears a very interesting plea by Dr. H. J. Oldstein of Scranton, Pa., for dental legislation for the elimination of advertising, charlatan dentists.

The local paper which circulates in my vicinity carries the advertisement of a dentist who engages to insert a filling free two mornings each week and that of another dentist who will extract free

merely to prove the truth of his assertion that his work is absolutely painless. You will search the rest of the newspaper in vain to discover a bootery which would give so much as an extra pair of laces free, or a haberdashery enterprising enough to offer a handkerchief free with every purchase, or a cigar store where you could smoke one cigar without charge to satisfy yourself that it is the best brand in the world.

It remains for the dentist to so lower



his dignity; and, in doing so, to drag down the entire profession to ridicule and disgrace.

To my mind, three factors are responsible for this condition:

*First.* The health authorities which do not properly regulate and inspect dental establishments. It ought to be absolutely illegal for any dental office to be in anything but the most thoroughly aseptic condition. Strict rules should be laid down, the violation of which would entail a fine and endanger the license of the violator.

Evasive and misleading statements, and claims to superior ability may no longer be made by these charlatan dentists. Their only means to attract the unwary is by offering to do work at a price they seldom, if ever, live up to. Newspaper publicity of the methods they employ would aid greatly in their reform.

In this connection, may I suggest to the dental societies that they make a greater effort to enroll in their ranks the newly graduated dentists. The first few years of dental practice are unquestionably the hardest, and it is during that period that many, otherwise very creditable dentists, become discouraged and resort to advertising. During that period the moral support of societies is essential and the process should be reversed; that is, the societies should seek the members, not wait for the members to realize the advantages of becoming members of dental societies.

The *second* factor in creating this disgraceful condition is the dental college. Too many men are permitted to matriculate who are entirely unfitted for the profession. There should be a test period of six months, during which the moral and mental and operative or mechanic traits may be developed and studied, and if found unsatisfactory, it would be for the best interests of the student as well as the profession that the man be dropped.

The curriculum could profitably include a course on The Business Side of Dentistry, where those who take up den-

tistry in order to earn a living (and there will always be a considerable percentage of this class) may be taught some of the business ideas and arguments an ethical dentist is justified in presenting to his patient. The iniquities of the advertising dental parlors could be so convincingly shown that I might safely predict the students would be prejudiced against them the rest of their lives.

The *third* factor controlling the situation is the public. There will always be the kind who are born sixty to the hour, ready to be victimized and as long as the victimizing is so easy, men without consciences will spring up to take advantage of them. Those poor souls are the ones the state authorities should make haste to protect.

We have, however, another class of people who must be helped in another way. I refer to the unfortunate poor. There exists a great mass of people, poor but proud. They realize the value of oral hygiene, they note with alarm the spread of caries or the need for a denture, but they cannot afford the fee of the private practitioner, nor do they care to accept the charitable service of clinics or dispensaries. They are the "shoppers" dentists thoughtlessly complain of; they are the ones who, in desperation, accept the services of the advertising quack in the hope (deep down in their hearts they know it is vain) that the millennium is here and they are about to receive something good but cheap. Alas! in these days of H. C. L., "it can't be done."

It seems to me that government dentistry would help these people; the sort of dentistry advocated by the opponents of the Compulsory Health legislation now proposed. And in helping the poor, it will deprive the advertising parlors of their main source of income. Thus it will "kill two birds with one stone," or rather, be doubly beneficial.

Yours very truly,

CHARLES WOLFF, D.D.S.

NEW YORK, N. Y.

## “Mercuric Cyanid in the Treatment of Vincent's Infection or So-called ‘Trench-Mouth.’”

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TO THE EDITOR OF THE DENTAL COSMOS:

Sir,—While in the “A. E. F.” it fell to my lot to treat many of the so-called “trench-mouth” cases which were infections of the oral mucosa and gingiva, caused by the Vincent organisms. In these cases I placed my dependence on salvarsan as I had done in civil practice, many similar cases having passed through my hands. During my sojourn in Germany with the Army of Occupation I used many other medicaments in an effort to clear up this condition more quickly, as every day meant loss of additional tissue. Mercuric cyanid which was being used in the treatment of syphilis was given a trial by me and I was astounded at the results. As it was possible to obtain but a limited amount of this drug, my experiments were naturally interfered with.

Since my return to civil life I have continued the study of this fusiform-spirochetal infection and, regardless of the severity of the case and extent of ulceration, after the application of mercuric cyanid the cases clear up with almost mathematical accuracy, with immediate relief to the patient after but one application and total elimination of the infection after several treatments. Coincident with this there is a clearing up of the tonsillar and lymphatic involvement.

A microscopic examination is first made and then a 1 per cent. solution of mercuric cyanid is applied to the ulcerated surfaces and inflamed gingivæ following a thorough forceful spraying of

the ulcers and gingival troughs with a physiologic salt solution which is rinsed out with plain water before the application of the mercuric cyanid. No more than 2 cc. of the mercuric cyanid solution should be used at one sitting.

The patient must be instructed not to swallow any of this most dangerous drug, and extreme care must be exercised in the carrying out of these instructions, as mercuric cyanid is exceedingly poisonous.

Work is under way at the present time to test the germicidal action and toxicity of mercuric cyanid and a further report in detail is in preparation.

I have used mercuric cyanid in the treatment of several typical pyorrhea cases with most astonishing results and it seems to give promise of being the general germicide for which we have been looking.

It seems to the writer that inasmuch as mercuric cyanid destroys the Vincent organisms in the mouth it no doubt would be efficacious in the treatment of the so-called Vincent's angina.

Very truly yours,

ARTHUR E. CORBY, D.D.S.

PHILADELPHIA, PA.

[NOTE.—Mercuric cyanid closely resembles corrosive sublimate in its action, but it is less poisonous and much less irritating. This drug is highly toxic when administered in sufficient amount internally, the dose as stated in the U. S. Dispensatory is 1/16 to 1/8 gr., and in the solution in which the writer uses it the maximum dose would not be reached unless the patient swallowed 0.5 mil or more.—Ed.]

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# PROCEEDINGS OF SOCIETIES

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## Symposium on Oral Hygiene.

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Held in Celebration of the Sixtieth Anniversary of the Continuous Publication of the DENTAL COSMOS, Scottish Rite Hall, Philadelphia, Wednesday Evening, January 21, 1920.

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Dr. EDWARD C. KIRK, Editor of DENTAL COSMOS, presiding, called the meeting to order at 8.30 P. M.

CHAIRMAN KIRK. It is now nearly half a century since the so-called germ theory of disease became a demonstrated fact by the researches of Robert Koch, of Berlin, and Louis Pasteur, of Paris, and their colleagues; that is to say, the causal relation between the germ and disease production was demonstrated by the researches of these scientists and was no longer a theory. And about that time a young American dentist, Willoughby D. Miller, who had recently received his diploma, began work in Koch's laboratory in Berlin upon the problem of the ages, so far as dentistry is concerned, namely, the causation of tooth decay or dental caries, and, as you all know, or most of you know, the result of that research was the demonstration of the germ origin of tooth decay. And having settled the question of origin of tooth decay, he continued his researches with reference to the bacterial flora of the human mouth, and published the results of his investigations in a series of papers entitled "The Human Mouth as a Focus of Infection." It was regarded at the time as being a piece of purely scientific work without very much practical interest; but in the light of recent experiences, and the new angle of view that we have achieved toward the whole

question of disease causation, when we come to look over that series of papers we are astounded at the far-reaching importance of the findings that Miller reported more than a quarter of a century ago. He reported, in the first place, the now well-known fact that the human mouth is the portal of entry for practically all of the disease-producing germs that enter the human body. Moreover, that it is a breeding place for germs, an incubator so to speak, in which the reproduction of these exciters of disease proceeds under most favorable conditions, and with great rapidity. He also announced, as a result of his investigations at that time, the fact that of these germs, that are constant inhabitants of the human mouth, a very large proportion are pathogenic in character—that is, disease producing; and what is, I think, of a still greater interest, he announced the fact that it was possible for certain of these germs to be transmitted through the circulation, or through the intestinal tract, or through the lymphatic system, to remote parts of the body, and there set up independent disease reactions. Miller also called attention to the constant poisoning of the body by the absorption of the poisonous products of germ activity in the mouth. So far as the scientific investigation of the problem is concerned, the principles upon which the unclean mouth becomes



a source of bodily disability in a variety of ways were laid down by the writings of W. D. Miller between thirty and forty years ago. But all of these findings lay dormant for a long time, practically dormant, until Sir William Hunter, of the Charing Cross Hospital, London, made his notable address before the opening session of McGill University Medical School in 1910, in which he showed that a great deal of the dental work that had been done—crown and bridge work, restorative work, or work that had been superimposed upon roots of teeth which were pulpless, in effect, where this work had been imperfectly done, the unsanitary mouth in general was one of the fruitful sources of a long category of diseases which he investigated from the clinical standpoint. He clearly established the relation between this unsanitary or imperfectly performed dental work, or the unclean mouth and these systemic diseases which were the result of the oral infection thus originated. Hunter's communication and also an address of the late Professor Osler, very pointedly directed the attention of the medical profession to this matter, and, I believe I may say, the attention of the public at large, because Osler's address, in which he called attention in general to matters which I have just recited, was given wide publicity in the lay press of America, in the principal medical magazines of England and this country, and in practically all of the dental magazines, so that a great deal of attention was directed to the damage to human health resulting from unsanitary mouth conditions. The dental profession had for years been endeavoring to attract attention to the importance of this problem. They had gone so far under Dr. W. G. Ebersole's leadership as to work out an experiment in oral hygiene in the public schools of

Cleveland, Ohio, which did result in a marked improvement in the health of school children, both in mental and physical efficiency, from the simple practical device of keeping the mouths of the school children clean and free from tooth decay. More recently, and more definitely, Dr. Alfred C. Fones, of Bridgeport, Conn., who had been one of the pioneer workers of the early hygiene movement, has worked out to a practical finality a four years' test of oral hygiene in the public schools of Bridgeport, and his findings are not only convincing but almost dramatic in their importance. So from the point of view of the public interest, from the point of view of the efficiency of the nation, from the point of view of the health of the oncoming citizenry of the nation, from the point of view of national defense, for when you consider that one man out of every four was rejected by the medical inspectors of the army at recruiting stations because of some physical defect—twenty-five per cent. of the flower of the manhood of this nation was not physically fit for national defense—and when you consider that a very large proportion of these defects originated in the human mouth, I can think of no question that is of more fundamental importance to the welfare of the nation than this question of the hygienic mouth. We shall have the subject presented to us from a number of angles of view tonight, and to introduce the principal topic, so that we may gain a knowledge of what has really been accomplished, as the result of a practical utilization of the resources of dentistry with reference to oral hygiene, we shall hear from Dr. Fones of Bridgeport. I, therefore, have great pleasure in presenting to this audience Dr. Alfred C. Fones, of Bridgeport, Conn., who will speak on "Oral Hygiene in its Relation to the Public Health." (Applause.)

## Oral Hygiene in Relation to Public Health.

By ALFRED C. FONES, D.D.S., Bridgeport, Conn.

IT was not my purpose tonight to analyze the demonstration which we have been conducting in Bridgeport, since we feel that the idea was presented in rather a detailed form in the report which was published this last year—"Five Years of Mouth Hygiene in the Public Schools of Bridgeport,"\* but to discuss the subject of mouth hygiene in its relation to public health, and to try and point out how serious a matter this is for consideration by each and every one who is practicing dentistry, in the hope that they will put their shoulders to the wheel and try to help bring about the solution of this problem.

Although dentistry has been practiced in some form or other for many hundreds of years, it was not until the years 1839 and 1840 that it was started on its career as a profession. In those years the first dental journal was published, the first dental society organized, and the first dental college founded. From this period until in the eighties, when Professor W. D. Miller published his book on "Micro-organisms of the Human Mouth," in which he proved conclusively the cause of dental decay, the principal study and effort of the dentist were directed toward repair and replacement of lost tooth structure. This effort still continues to be the chief interest of dental science, but Professor Miller's scientific work, as well as the preceding discovery of Pasteur concerning micro-organisms, opened a new field of thought and investigation which has been gradually developed until, at the present time, we are brought to realize the great influence the teeth and

their supporting structures play in the production of disease. Heretofore practically all effort and concentration have been put forth upon the hard tissues, namely, the enamel, the dentin, and the alveolar process. Today we realize that dentistry must concentrate upon the soft tissues, the gums, the pericementum and the pulp, for these are the tissues chiefly involved in permitting the ingress of bacteria into the lymphatics and thus in the production of many systemic infections.

Although there are other phases of dental pathology which may produce a detrimental action either locally or systemically, the following three conditions are most prevalent and by far the most serious: (1) Unsanitary mouths, with decayed teeth and decomposing food. (2) Diseased pericemental tissues. (3) Devital and infected teeth.

When it is realized that barely 15% of our people use a toothbrush, the picture of the unsanitary mouth cannot be overdrawn, nor can the great prevalence of such mouths be overestimated. Inflamed and congested gum tissue, broken down and decayed teeth, green and brown stains, calcareous deposits and decomposing food debris—these mouth conditions are the rule and not the exception. The evil influence of the immense numbers of bacteria in such mouths is noticeable on the tonsils, the pharynx and the gastro-intestinal tract. The toxic influence of unclean mouths is especially noticeable in children, frequently producing headache, malaise, dizziness, imperfect vision, slight fevers, diarrhea, and a general condition of malnutrition. And these minor ailments can only be considered as secondary to

\* DENTAL COSMOS, July 1919.



the dangers of systemic infections which are frequently produced by the actual penetration of the bacteria through the mucous membrane of the tonsils, the pharynx and the intestines.

The next factor is that of the inflamed and diseased tissues supporting the teeth. For quite a number of years dental pathologists have repeatedly called attention to the dangers of these pericemental infections as a probable cause of systemic disease, and since Professor Noyes' definite demonstration of the network of lymphatic vessels in the pericemental tissues, even to the extreme borders of the gingiva, there can be no doubt of the ingress of bacteria through these vessels into the blood stream, and their subsequent localization in some of the other tissues of the body. There is much scientific and clinical evidence to prove that pyorrhea alveolaris is a cause of systemic infection which may be produced in three ways: (1) by the constant exudation of pus in the mouth and thence into the digestive tract, (2) the absorption by the lymphatics of the bacteria and their toxins present in the deeper areas of the infected tissues, (3) by the pumping action of loose teeth in their sockets during mastication, forcing bacteria and their toxins into the capillaries and thus into the blood stream itself.

It has been estimated, and I believe correctly, that more teeth are lost from pyorrhea alveolaris than from dental caries. These pericemental infections with inflamed gum tissues must eventually be considered in the prevention of tuberculosis, the next great advance in the elimination of which will be accomplished when unhygienic conditions in the mouths of the people are bettered. The medical man must realize that the gingival borders of the gums present an area eight times greater than that of the crypts of the tonsils, and that in the average mouth the gums are congested and bleeding. This provides the ideal culture medium for the tubercle bacillus. Add to this the lowered bodily resistance induced by the absorption of the poisons generated by the immense numbers of bacteria present in such mouths, and it

makes a pathological combination that seriously hinders the medical profession from making any further greater reduction in the mortality from this disease.

The third phase for consideration is proving even more serious than the first two, for the X-ray has revealed to us infected areas within the bone tissue at the apices of the roots of the teeth which we have heretofore never suspected. These apical infections are found only upon teeth with devital pulps and have remained so long undiscovered because the action of the streptococcus viridans is so subtle and produces no local soreness, pain, inflammation or pus.

Our research workers have clearly demonstrated that, under certain conditions, the streptococcus viridans in the apical infection becomes aggressive and migrates, developing a selective action which varies in affinity for different tissues of the body, and the work of Billings, Rosenow, Hartzell, Thoma and others has proven scientifically that they are the cause of many of the most serious systemic infections, especially those involving the heart, the kidney and the joints.

The interesting work of Dr. Henry A. Cotton, medical director of the New Jersey State Hospital, at Trenton, has firmly established the relation of oral infection to certain types of nervous and mental diseases.

The general practitioner in dentistry who is doing serious X-ray work in his practice has abundant clinical evidence of the appalling commonness of apical infections, and it is not necessary to review the long list of secondary infections that have been directly attributed to these primary foci. It can, however, be truthfully stated that, because they are so prevalent, they are the most serious menace to health that has yet been presented to the dental and medical professions.

Is it not plain how hopeless the situation is? Dental caries is so exceedingly common that it is difficult to find two school children out of a hundred with perfectly sound teeth, and even in early childhood our school children average seven cavities per child. Consequently



there are few young people who escape a pulp involvement due to the penetration of the bacteria through the tooth structure, destroying this delicate and sensitive tissue. Pulpless teeth are, therefore, so prevalent that it is the exception for an adult over thirty years of age to present a mouth without one or more devital teeth, which already have, or which may develop, an apical infection.

This brings us to a realization that dentistry can no longer be considered as a luxury, but that dentistry in some form is an absolute necessity for everyone. We are forced to the conclusion that we are now facing our most serious public health problem in these pernicious mouth conditions, and that there is no one factor so important to public health. Mouth hygiene must be considered as the most important and most pressing health measure.

With whom does the responsibility for the solution of this problem rest? The dental profession? If so, can the dental profession, as it exists today, cope with the problem? Let us make a brief analysis of the situation.

There are, in the United States, about one hundred and ten millions of people. From statistics based upon the examination of the teeth of children in the public schools in various sections of our country, we deduce that fully 95% of this number are afflicted with decayed teeth. There are approximately forty-eight thousand (48,000) dentists in the United States. These men cannot give proper dental service to more than fifteen to twenty millions. There are, in other words, but fifteen to twenty millions of people who are sufficiently educated to a realization of the importance of the care of their teeth, to visit the dentist with any degree of regularity. Even under these conditions, the time of the average dentist is wholly filled with the relief, restorative and repair work needed by these people. This leaves eighty millions who give little or no attention to their mouths, excepting possibly to have a tooth out when it aches. Good dental service is expensive, so expensive, in fact, that it

has always been considered a luxury. Must we not conclude then that the eighty millions of people for whom there is no provision in dentistry form the great working classes to whom sound teeth are a necessity for good health?

Do we need more dentists? Yes. But how are we to secure them? The modern tendency of our dental colleges is to provide the profession with better equipped men, to raise the standards of entrance requirements, lengthen the college course and enlarge the curriculum, until eventually the average dental graduate will be twenty-five or twenty-six years of age. In a short time the standards for dental education will equal those for medicine, and both the dental and medical students will be required to pass an academic college course before they enter the four years' professional course. And this is as it should be. The man who is to handle the serious conditions which are present in the average mouth must be fully equipped for this service, for, to many of his patients, it will be a matter of life or death.

From the foregoing analysis we are confronted with the fact that, although this public health problem should belong to the dental profession, the profession as it stands today is not able to shoulder it, and our colleges can never turn out graduate dentists fast enough to even cope with it. And we are further forced to admit that not only is the dental profession unable to cope with mouth hygiene as a public health measure, but the average dentist cannot cope with the need for mouth hygiene as a private health measure, even for the patients in his own practice. For this condition we do not hold to account the dentist who admits that he cannot cope with the appalling conditions alone, for he has been pushed to the last notch in the attempt to meet the great flood of relief, repair and restorative work which has come upon him. But what of the dentist who opposes every effort to provide the dental profession with the help it must have and the public with the service it so badly needs?

We have known for many years that

these pernicious mouth conditions are unnecessary. It has been proved that 80 to 90 per cent. of dental decay can be prevented by a system of extreme cleanliness and correct diet, especially in the elimination, or at least the restriction of the consumption of free sugars.

We know (1) that the bacterial plaque is the initial stage of dental caries, and that frequent removal of these plaques from all the surfaces of all the teeth by hand polishers is the most efficient means, aside from a correct diet, for the prevention of dental caries. (2) That the frequent removal of all calcareous deposits around the necks of the teeth by the use of instruments is most effective in the prevention of infection and destruction of the dental tissues surrounding the roots of the teeth. (3) That the faithful use daily of the toothbrush and floss silk, and of a mouthwash, such as lime water made from coarse calcium oxid, is the best means known for the thorough removal of food débris and dissolving the plaques. (4) That nearly all micro-organisms in the human mouth are harmless if deprived of a pabulum, such as food débris, upon which to feed, develop and multiply.

Now, if these are facts, how shall we make a practical application of them to aid the populace in preventing dental caries, pericemental infections, and in appreciating the importance of clean mouths and sound teeth?

The answer, in my judgment, is by means of the dental hygienist, a woman educated and trained in this specialty. The first effort to demonstrate the great service that such women could render was made in Bridgeport, Conn., in 1914, when the first class of dental hygienists was graduated. In 1915 a second and in 1917 a third class was graduated. The efficiency of these women in carrying out educational and preventive measures, and the great benefits that have emanated from her services has resulted in the establishing of organized training schools for dental hygienists at Columbia University, New York City, the Forsyth Dental Infirmary of Boston, the Roch-

ester Dental Dispensary and the Colorado College of Dental Surgery at Denver. The organization of several additional training schools is now under way, and during the past five years twelve states have amended their dental laws to permit of the practice of dental hygienists under the general supervision of the dentist. The dental hygienist is firmly established; the present demand for her services is far greater than the supply, and nothing can stop this educational and preventive movement.

The present need of the dental profession, in solving the public health problem of mouth hygiene, is an immense corps of women workers educated and trained as dental hygienists and therefore competent to enter dental offices, infirmaries, public clinics, sanitariums, factories and other private corporations, to care for the mouths of the millions of adults who need this educational service so badly. The need in every state is so great that every state must provide its own training schools, and if the dental profession will not meet the situation, the state health or educational authorities must do it. This is the only sane and logical method by which any help can be provided for the adult population with the almost hopeless mouth conditions which now prevail. The damage has already been done and there are not enough dentists to restore the lost tooth structure in one-fifth of these mouths. There is, however, a service that the dental hygienist can give in correcting the uncleanness, and in education for the prevention of further disease.

The real field for prevention is not so much in the adult mouth, but is at the very source where the evil originates, and that is in the child's mouth. The greatest work to be done is in the public schools. For five years we have been demonstrating the value of an educational and preventive dental clinic in the Bridgeport schools, and it has developed into one of the most important parts of our school and health systems.

Under the plan of this clinic, every child in the first five grades undergoes



an examination of his mouth, and receives a prophylactic treatment of his teeth at regular intervals, accepting it as a part of the curriculum much the same as his lessons. Every child in these grades is taught a method of brushing his teeth and is educated in the care of his mouth. In this way the municipality accepts one-half of the responsibility, that of aiding and educating the children in the prevention of dental decay, while the home care of the mouth and proper feeding must be assumed by the child and his parents,—a plan on the fifty-fifty basis.

During the past year we have cared for the mouths of twenty thousand individual children with a corps of twenty-six dental hygienists, two supervisors, and an assistant supervisor, who are also dental hygienists, and three women dentists. The service of the dental hygienist consists in the actual cleaning and polishing of the children's teeth in the schools, the examination and charting of mouth conditions for permanent records, individual instruction in the care of the mouth, toothbrush drills and talks in the class rooms. Supplementary to this are stereopticon lectures given by the supervisors and dentists for the education of children in grades four to eight. Illustrated pamphlets are sent to the home for the education of the parent and to gain co-operation.

This has been a pioneer work and was begun during the war period which produced very unsettled conditions in our schools. However, we have proved that the teeth of children carried through this five-year demonstration show, at the end of the period, a reduction of 33.9% in dental caries. This figure represents the average reduction of dental caries in the fifth grade of thirty schools. The record in some schools was quite remarkable, one school having as high an average as 67% and several with averages of over 57%. The comparisons which we have been able to make in our health records also convince us that mouth hygiene is a very powerful factor in the reduction of communicable and infectious diseases in childhood.

We do not claim that mouth hygiene is a panacea for all the ills of the school child. Instead we are daily confronted with the fact that there is a crying need for a general health program of considerable magnitude for the prevention and correction of other remediable physical defects beside those found in the mouth.

It has been truly stated that the diseases of which we die in adult life are frequently those which are contracted or made possible in early youth. The data collected by the draft boards have revealed to us the fallacy of specializing on the child's brain and ignoring his body.

Watching the children in the chairs of the hygienists in the schools, and noting some minor physical defects which are apparent to even a casual observer, I suddenly realized that the medical profession was confronted with a problem similar to that of dentistry.

With the long and expensive education and training now required for the prospective physician, could the medical profession hope to send medical men into the public school system in sufficient numbers to examine every child and record the condition of the eyes, ears, nose, chest, back, feet, height and weight? Will they not also be obliged to have the data secured and the classifications made for them so that the trained medical mind may concentrate upon the final diagnosis? It hardly seems practical to attempt to add the physical examinations to the field of the medical nurse. Her training is such that she is indispensable in the care of those who are already sick.

For the moment, I would ask you to consider that, by training, neither the medical nurse nor the dental hygienist is especially fitted to undertake the physical supervision of the child, either working separately or together.

This brings us to a plan I would like to present to you to provide the children in our public schools with the same careful supervision of the physical development that is now accorded the mental development. And just as the supervision and training of the child's mind is intrusted to one person, the teacher, so



should one person be charged with the supervision of his body. Let us call this person the Public School Hygienist, a woman trained and educated dentally and medically to a sufficient degree to act as physical inspector, prophylactic operator and teacher of health and hygiene. In other words, we will Burbank the medical nurse and the dental hygienist, and thereby eliminate the unavoidable friction of two workers with separate interests.

The public school hygienist will be supplied in much the same way as the public school teacher. She will be a high-school graduate trained in the State Normal School for Teachers, receiving, in addition to the regular normal school courses in pedagogics and psychology, the special medical and dental education to fit her for her field of service, and she will enter the public school system on the same basis as the public school teacher.

The practical application of this plan would be as follows: The public school hygienist would be permanently located in a school and charged with the supervision of a certain number of children. She would prepare a normal diagnosis for each child under her supervision. That would mean the recognition and recording of any deviations from the normal in the eyes, ears, teeth, nose, throat, chest, back, feet, height and weight.

The medical and dental men are thereby relieved of the necessity of expending an enormous amount of time and energy upon the sorting and classification of normal children from the abnormal. The way is thus cleared for the concentration of the highly specialized mind upon the final diagnosis. The recommendations for the correction of remediable defects, either through the family physician and dentist or through the municipal clinics, are made and it becomes the responsibility of the school hygienist to work through the child and the home to the end that the defects are corrected.

Once the physical defects which interfere with proper growth and development are recognized and recorded, the school hygienist begins at once the teaching of health habits, the group competitions

based upon weight and height, the cleaning and polishing of the teeth, the tooth-brush drills, the food talks—in short, the physical education and supervision of the child.

It is not possible at this time to give further detail of this plan, but it is not necessary to picture to this body of professional men what such a system would do for the boys and girls of the United States, and after all, it is only through the concentration of our efforts upon them that any great improvement in personal and public health can be secured.

#### SUGAR AS THE CAUSE OF CARIES.

In conclusion I would like to refer to a statement made previously in this paper concerning the relationship of dental caries to the use of free sugar. Personally, I believe that in childhood a well-balanced diet, with special emphasis on the calcium-content foods and the elimination of free sugar, would result in practical immunity from dental caries even in the absence of a rigid system of mouth cleanliness.

For thirty years we have known definitely that the actual cause of dental caries was the action of micro-organisms on sugars and starches, reducing them to lactic acid which is the solvent for the cementing substance joining the enamel rods. The causes of susceptibility and immunity are still under investigation, but I believe that susceptibility is mainly in proportion to the consumption of free sugar, and that immunity is acquired, in great measure, by the absence of free sugar in the dietary.

Assuming that the excessive consumption of free sugar is the most important factor in creating susceptibility, the question arises as to whether the detrimental action is purely local or a combination of local and constitutional factors.

In 1913 Dr. Edward C. Kirk, in presenting a paper\* before the Toronto

\* ("A Reconsideration of the Etiology of Dental Caries, and a New Theory of Caries Susceptibility." Kirk, DENTAL COSMOS for January 1914.)

Dental Society, suggested as a subject for research the relationship of the constitutional effects of an excessive carbohydrate diet to caries susceptibility. He stated "Let me direct your attention to an aspect of dental caries that has not, so far as I am aware, received the serious consideration that it deserves. The direction of progress of dental caries is from the free surface of the tooth toward its interior, until finally the pulp chamber is invaded. If we examine under the microscope a section of carious dentin cut parallel with the tubuli, we find the bacterial invasion proceeding pulpward from the dentino-enamel junction. The sectional area of the tubules nearest the enamel shows the greatest enlargement and is packed with organisms, whereas that portion farthest from the enamel junction gradually tapers off until at the extreme limit of bacterial invasion the lumen of the tubule is so narrow as to contain but a single micrococcus. If dental caries is dependent upon lactic fermentation of alimentary carbohydrate debris, how is it that the direction of advance of the bacterial invasion is away from the source of food supply rather than toward the food supply? . . . . When we consider that the blood plasma itself in caries-susceptible individuals probably contains an amount of sugar above the physiological normal, then it seems rational to conclude that the blood plasma, or its equivalent in the juices of the dentinal fibrillæ, can furnish a sufficient amount of carbohydrate material for the nutrition of caries-producing organisms."

Since the valuable experiments of Dr. Russell W. Bunting and others show conclusively that the enamel is a permeable membrane, the possibility of constitutional influences seems unlimited. If, according to the laws of osmotic pressure, salts from the blood and saliva pass readily through the tooth structure, is it not possible that there could be an interchange of other constituents of the blood and saliva that would also help to establish immunity or susceptibility? Might not the lactic acid formed by fermentation processes on the surface of the

tooth be attracted by some constituent of the blood circulating through the pulp, possibly a like product of fermented glucose absorbed from the intestinal tract? Such an attraction would encourage the penetration of the lactic acid through the enamel, producing the initial stage of dental decay. If such were the case, we could account for the fact that many unclean mouths are wholly immune in spite of the presence of bacterial plaques on the teeth, while seemingly clean mouths are vigorously attacked by dental caries. In the former the free sugar consumption might be so limited as to produce no abnormal product in the blood and body juices, and the constitutional factor would thus be lacking, while the latter case would be just the reverse.

Cane sugar has been used for hundreds of years by different nations, and they have invariably shown a susceptibility to dental decay. Free sugar is not a natural food and Nature never intended that it should be extracted from the cane and beet to be consumed in excessive quantities as it is today.

When we consider that dental caries can only be produced from starch and sugar and that the starch must be reduced to dextrose before it can be converted into lactic acid, it is quite truthful to make the statement that all dental decay is produced by sugar. In the Bridgeport schools we are using this truism in the following jingle:

"Children, you should learn this truth;  
Nothing but sugar decays a tooth."

Clinical experience and general observation, however, seem to show that the high consumption of starchy food if unaccompanied by free sugar does not result in dental decay. In fact, the evidence is all against the sugar. Among the peasant classes of Italy, Greece, the Balkan States, Germany, etc., where the diet consists mainly of coarse foods, vegetables and fruits, but where free sugar is a luxury and cannot be indulged in, decayed teeth are the exception and not the rule. This is also true of the Es-



quimaux, the African Negroes, the American Indians, the Maoris of New Zealand and many of the South Sea Islanders.

In the examination of the mouths of many hundreds of draftees, we noted especially the mouths of the Italians, many of whom had thirty-two perfect teeth without a cavity or filling, and yet these men had reached twenty-one years of age without even owning a toothbrush, and had consumed quantities of starchy foods. They stated that they did not care for sweetened foods, and we found later that the free sugar consumption in Italy averages but thirteen pounds per capita per year—less than a teaspoonful a day. In this country we average nearly one hundred pounds per capita per year. The American mother would be inclined to question this average, but few realize the enormous amount used weekly in the average home for cooking alone.

The medical profession is to a great degree responsible for this situation, for the family physician has taught mothers to believe that free sugar is an essential food for growing children.

Under the existing conditions, what chance has an American child to have sound teeth? If he is a modified-milk baby, sugar is added to the milk in the proportion of one ounce in twenty at only a few weeks after birth, and all too frequently cane sugar takes the place of milk sugar. The taste and craving for sugar is developed at once and is steadily encouraged as he progresses to cereals with sugar, puddings, jellies, sweetened crackers, etc. To the normal sugar supply found in milk, vegetables, fruits, and in the conversion of starchy foods, is added an ever-increasing amount of free sugar at meal time, augmented between meals by soda water, ice cream and candy. The sugar consumption is so excessive that the liver is overloaded with glycogen, and I believe that herein lies the secret of the child's susceptibility; not only in the fermentation of the sugar on the teeth, but also in the action of osmotic forces through the enamel with the blood and body juices

which are surcharged with glucose and the absorbed products of fermented surplus glucose from the intestines.

There can be but one result; the deciduous teeth are attacked by dental caries, and at the beginning of his school life the child presents a wrecked mouth and it is only a matter of time before the permanent teeth are similarly affected.

And so we find that the medical profession, by advocating free sugar as part of the diet, is constantly creating a disease known as dental caries, which demands a specialty known as dentistry. Dentistry in turn has filled, crowned, and capped these decayed teeth in innocence and ignorance of the bacterial colonies which exist on the ends of the roots of pulpless teeth, causing secondary infections of the heart, kidneys, joints, etc., thus returning the compliment to the medical profession by creating thousands of cases of systemic infection to be given over to its care and treatment, with the public as the victim.

Neither the medical nor the dental profession has realized that this vicious circle existed, but no great reduction can be made in dental caries and resultant systemic infections until this circle is broken.

The American people have been slowly educated to a knowledge of the evils of alcohol until we now have National prohibition. Any great reform must be accomplished by the same painstaking enlightenment, and American mothers who have for generations been educated to look upon free sugar as a food must now be taught that free sugar is the chief cause of dental decay, and that dental decay is the chief cause of many of the serious illnesses of childhood and adult life.

A number of years ago one of the leading surgeons of the country made this statement: "The next great step in preventive medicine should be made by the dentists; the question is, Will they do it?" I should like to amend that statement to have it read: "The next great step in preventive medicine should be made by the medical and dental professions by advocating a correct diet for



children from birth to fifteen years of age, and from which free sugar shall have been eliminated."

I have a few films that I have brought with me to illustrate the work, as I thought you would be interested in seeing the oral hygienist at work in the schools. We also have them working in other fields of endeavor.

(The pictures were here shown in three parts, illustrating the hygienist at work in the schools, outside of the schools, and the character of the literature used for publicity).

CHAIRMAN KIRK. Oral hygiene has its individual, its municipal, its state and national relationship. It has recently become a subject for national consideration in England as a result of the experience of the British forces during the war, in which the need for careful attention to the mouth became one of the serious items in maintaining the health of their offensive forces, just as it was here. I may say that the attempt upon the part of the British army forces to procure or provide adequate dental care for their soldiers was a failure—at least comparatively a failure—it broke down; but by just that breakdown it became so evident to the health and military authorities of Great Britain that adequate provision is being made for carrying dental service, which involves oral hygiene, practically to all of the inhabitants of the British Islands; so that there it is to become a national question articulated with the health administration. There has been appointed a commission to look after the dental side of the matter in Great Britain with an officer who is in effect a special minister of dental health. It is coming to be a national question here. The National Public Health Service of the United States has become intensely interested in the question of oral hygiene as a factor of public health, and Lieutenant-Colonel Buell, who is Chief of the Dental Section of the National Public Health Service, has very generously consented to say a few words to us tonight on the subject.

I have pleasure in introducing to this audience Lieutenant-Colonel E. EUGENE BUELL, Chief of the Dental Section of the National Public Health Service, who will say a few words to us about the oral hygiene activity of his department.

**Address by Dr. E. Eugene Buell,**

Chief of the Dental Section, United States  
Public Health Service.

*Mr. Chairman, ladies and gentlemen,* Dr. Fones' paper has been most interesting and instructive and I wish to compliment him upon the able manner in which he has covered the subject of oral hygiene. His pictures have been especially interesting and I wish every town in this country could receive the benefit of their educational value.

My appearing before you this evening is in response to a request that I give to this dental audience a brief résumé of the activities of the Dental Section of the U. S. Public Health Service.

The Section was authorized under an Act of Congress in March, 1919, and commenced functioning in June. The purpose for which it was authorized was in order that patients, to whom the Public Health Service had been giving medical care, might also receive the necessary dental treatment to which they were entitled. This Act of Congress also provided that all sick or disabled discharged soldiers, sailors, marines and war nurses who are suffering from any form of medical or dental ailments caused or aggravated by their military service, are entitled to treatment by the U. S. Public Health Service.

The patients requiring dental care are receiving treatment from two sources. Commissioned dental officers are stationed in each of the Public Health Service hospitals to care for the patients in the hospitals and such cases in the immediate vicinity as may require dental attention. You can readily see, however, that there are thousands of patients who are eligible for treatment who cannot be reached by these clinics, so these patients are being cared for by civilian dentists

who are appointed as dental examiners throughout the country. The dental examiners work on a fee basis, and patients are referred directly to them by the district supervisor of the district in which they reside. The country has been divided into fourteen districts, each district having its district supervisor and working with him a supervising dental surgeon who has charge of organizing the Corps of Dental Examiners and the keeping of records, etc.

At the present time the corps consists of eighty commissioned dental officers and about 3000 civilian dental examiners.

Although both the commissioned corps and the dental examiners have just begun to function, a great many patients of the Bureau of War Risk Insurance and other beneficiaries of this service have been rendered dental treatment, and it is anticipated that the requests for dental care will be very numerous as soon as the beneficiaries are aware that they may obtain it from this service.

I wish to thank you for your very courteous attention, and I hope that I may have the pleasure of meeting with you again after a year or so has passed and the Dental Section of the U. S. Public Health Service has become a well-developed organization.

CHAIRMAN KIRK. I am extremely sorry that Dr. Martin, Commissioner of Health for Pennsylvania, has been called away on a professional case, and therefore is unable to be with us tonight. He has expressed a very deep interest in the purpose of this meeting and he has a very practical interest in the subject himself. Someone has said that the greatest asset of the State is the health of the school child. We have now come to the point where we believe that in order to have a healthy school child, to conserve this important asset to the body politic, he must have a clean, healthy mouth. It is a realization of *mens sana in corpore sano*, the prophecy of the old philosopher Juvenal, that to have a sound mind we must have a sound body, for we now know that to have a sound body we must have sound teeth and a

healthy mouth; so you see the question of oral hygiene links up very definitely with the question of the education of school children. We have asked Dr. John P. Garber, the Superintendent of Schools of Philadelphia, to speak to us from the point of view of the school child. Dr. GARBER.

**Address by Dr. John P. Garber,**  
Superintendent of Public Schools,  
Philadelphia.

*Mr. Chairman, ladies and gentlemen,* I hope I shall manifest due humility coming as a layman to speak to experts. I shall probably modify the statement of David Harum; when he was twitting his sister a little beyond her endurance he was very fond of saying, "If I said anything for which I am sorry, I hope you will forgive me." I shall have to modify that and say, if I say anything revealing my ignorance on this expert subject, I hope that you will forgive me. I realize, from what Dr. Fones has said, the magnitude of the problem of oral hygiene as pertaining to a city the size of Philadelphia. We have about ten times the school enrolment, as I understand it, that they have in Bridgeport, Conn. I do not, of course, maintain that that in every respect entails upon us ten times the magnitude of their problems, but I do hope you have due sympathy with the Superintendent of Schools in Philadelphia when you remember that oral hygiene is only one of our many, many troubles.

I think I shall keep on safe ground in the few words I have to say by telling you what we are doing along the line of health and health teaching in our Philadelphia schools, safeguarding the health and endeavoring to carry the message over into the lives of the pupils, and especially to get it into the homes—one of the most difficult problems that education people or social workers have to deal with. In the first place, we have in the way of knowledge and training in the schools what we believe to be rather an excellent course of study in health teaching. We have teachers who I believe on the whole are alive to the



importance of the subject, and are doing a very great deal not only to get across information, but to get established health habits in the lives of the pupils. We have also medical inspectors who look after general conditions particularly as they apply to the prevention of contagious diseases and a discovery of physical defects that need remedying. But when I tell you that we have only about fifty of those people for our entire system, you can understand that, when in Bridgeport, Conn., they have a force of twenty-eight, I believe Dr. Fones said, for their 23,000 children, each one having less than 1000 pupils, we would need here in Philadelphia even for the oral hygiene approximately three hundred persons. You can see how very inadequate our force is for the entire health problem from the medical standpoint. We also have, in addition to the fifty medical inspectors, about forty nurses. I have urged upon the Board of Education the importance of this subject and the necessity of increasing our forces, and I believe some of them are seeing the necessity for it. You, as loyal Philadelphians interested in the education of the children, I ask you in your respective spheres of influence to endeavor to carry that problem across, so that we may have more adequate medical inspection and be able to do more of these things in a more adequate way than they are being done. We have not neglected this question of oral hygiene entirely. We do have the toothbrush drills and some of these things in the schools, but they are not, we must admit, carried out as effectively as they are being carried out in Bridgeport, Conn., according to the statement of Dr. Fones.

I realize that the health of the child is a fundamental thing in its education, and have no doubt whatever that these health problems either help or mar the education and the working efficiency, studying efficiency and training efficiency, and later on the working efficiency of everyone passing through our schools, and I believe it could be very fully demonstrated that it really pays the public to spend a very great deal of

money on its health problem, getting it over into the lives of the children and getting it into the home. A city like Philadelphia would achieve a material gain by spending a great many thousands of dollars on this health problem.

Referring to Dr. Osler, as referred to by the chairman of the meeting, I believe he said that there was greater physical loss from neglect of the mouth and teeth than the world has suffered from the ill-effects of alcohol, terrible as they have been. I do not mention that with the idea of speaking or referring in any words of disrespect to the dead and buried (laughter), but simply to emphasize the thought that has been emphasized here this evening, and which has so often been demonstrated—the importance of the health project to the welfare of society in general.

Now a few words along practical lines as to how we shall get the problem across in Philadelphia. I have referred to the inadequacy of our medical force. The probabilities are that in no large city can the Board of Education carry the entire problem, but anything that we can do here in Philadelphia toward securing the co-operation of the city authorities, or the Department of Health particularly, will be done, and I happen to know that they are sympathetic with all of our health problems. There must be a combined effort of the health authorities and the school authorities, and linked up with both of them many of the other general problems pertaining to housing conditions and so on. In other words, the public here in Philadelphia, as in every large city, I believe should realize that these are big problems affecting every one in the city, and that, therefore, being such large and important problems, the taxpayers should be educated to the point where they are willing to put sufficient money into the matter to make it effective. I am convinced, after many years of educational work, that we so often do not go quite far enough in our expenditure of money to reach our desired results. We stop short of efficiency because we are not willing to put quite enough money into



the thing to produce the results. The good business man and the effective industrial man goes far enough these days because he sees the absolute necessity for it, and I believe that in all these public problems we must reach a point where as citizens, taxpayers, friends of education, as persons interested in national problems, we must be willing to work absolutely along the line of putting sufficient money and energy into the thing to produce effective results.

CHAIRMAN KIRK. Somebody has said that life insurance was a bet or gamble between the corporation and the insured as to how long the latter would live. I don't know how true that may be or how truly it expresses the situation, but it does seem to be the aim of the life insurance companies to keep their policyholders alive as long as possible so that they will keep on paying premiums and make it worth while for the company to meet the death loss. At any rate, the insurance companies are interested in oral hygiene as a health protective measure and the Metropolitan Life Insurance Company of New York very particularly has shown its practical interest in this matter by establishing an elaborate hygienic clinic as we have seen demonstrated upon the screen this evening. That activity is due to the interest and the energy of Dr. Thaddeus P. Hyatt, Director of the Dental Clinic of the Dental Service of the Metropolitan Life Insurance Company; also Lecturer on Oral Hygiene of the Department of Education of the City of New York. Dr. Hyatt has consented to speak to us on the question of oral hygiene from the point of view of his large practical experience in the work. DR. HYATT.

**Address by Dr. Thaddeus P. Hyatt,  
New York, N. Y.,**

Lecturer on Oral Hygiene for the Department  
of Education, City of New York; Dental  
Director of the Metropolitan Life  
Insurance Co.

*Mr. Chairman, friends,*—I always wish, when I am to speak upon the question of oral hygiene, that I could elim-

inate the degree of D.D.S. I always feel that it is a very great handicap in discussing this question with other men in other professions, and particularly with the laity, for this reason: when I advance the argument as I think logically, I am confronted with the remark, "Oh, well, Dr. Hyatt, you feel that way because you are a dentist." You go and ask some of the physicians and they will tell you that one of the most important questions in regard to health is their specialty—it might be the eye, ear, nose, or the heart, or the stomach—and they want something put into the public schools to look after the child's stomach, etc., and you are simply interested because you are a dentist. I feel that it is a great disadvantage, because I feel myself—naturally we all want to be logical, that I am looking at it from a purely logical point of view regardless of the fact that I am a dentist; and I will tell you why.

Should mankind, his physical being, be so constructed, that the nourishment that sustains life were to be taken into the body through some other orifice than the mouth and that orifice was not used for talking and had to be protected because any injury to it would endanger the life of that human being, you can readily appreciate how very careful we all would be of that particular orifice, and probably would put on some armor to protect it, because our very lives depended upon it. Do you ever think of that? We cannot live without food, we cannot live without liquid, and we cannot live without air, and the air is affected by the condition of the mouth, and the foods are affected by the condition of the mouth, and the liquids, particularly, are today affected by the condition of the mouth. Hence, any change from a healthy condition of the mouth damages the foods, and it seems to me an exceedingly strange thing that our civilization in this country should be taking up the question of oral hygiene almost as the last item in its health propaganda.

We spend millions of dollars every year in the United States of America so

that the food shall be inspected and that it shall be as pure as it is possible for mankind to have it. The city of New York spent \$177,000,000 toward water-works alone, and yet you go to them and ask them to appropriate any money to take care of the mixing chamber, the last mixing chamber of the food, through which the food is taken into the body to be digested and assimilated, and they hold up their hands in horror at the idea of the expense. Let us forget all that and think of this question as taxpayers. I want to look at this question in what I would call a practical way, and with all due respect to physicians and all the work that the Health Department is doing, I still maintain that if they want to economize they have got to start at the mouth. Why? In our City of New York it costs \$40 to educate one child through one year. If that child is held back, or fails to pass his examination, there is an additional expense of either six months or one year for re-educating that child. We have found in the examination of the school children in New York that in one room where the mouth condition was the worst, in one of the high schools in Brooklyn, that in that room every child (girl) had failed to pass her last examination, which means, at the very least, an expense of \$20 a year to re-educate each one of those girls in that one room. You ask Dr. Fones, you ask anybody that has been associated with this work, and you will find it will cost less than \$5.00 a year to take care of the mouth of a child.

Let us realize what an unclean mouth means, realize what Dr. Fones has said about the mucous membrane of the gingival borders in the mouth presenting an area eight times greater than that of the crypts of the tonsils. No physician will question the great harm that will come to any child with diseased tonsils, as it impairs the food by infecting it, the child is swallowing the pus or the discharge that may not necessarily be pus and yet be poisonous; they recognize all that with respect to the tonsils and yet the people in authority are loath to recognize that the mouth itself will con-

taminate and adulterate the food when such a child is eating; he does not get the nourishment from his food; and does not develop the physical ability to properly carry on his mental work, and we are squandering millions of dollars simply because we won't be logical.

It has been asserted that the dentists are advocating this idea from self-interest; that is not so. I will guarantee that Dr. Fones, and every other man who has looked into this question, has looked into it from a purely logical and humanitarian point of view. It is an extravagant waste to spend millions of dollars every year in the re-education of children, and millions of dollars for the purity of food, for the purity of water, and then allow the mouth to be as filthy and diseased as these mouths of our little ones. It comes down to a purely practical business question. The clinics or the experiments that have been conducted by Dr. Fones were only experimental to the extent that they were to be used to convince those that did not believe it. I know very well that Dr. Fones knew what results he was going to produce before he started to do it, just as any student of this question knows what he is going to accomplish before he starts.

The statistics gathered in the Chicago schools show that of the children that were not promoted, ninety-eight per cent. had physical defects. Of those that had physical defects, ninety-nine per cent. were dental defects. Ninety-nine per cent. of these children that had physical defects had dental defects. In the schools in Cleveland it was shown by careful study that those children that had their mouths put in a clean condition improved in their studies anywhere from forty to eighty per cent, and not only that but in their physical well being. I do not want to detain you any more than to say I wish all of the dental profession of this State of Pennsylvania were here; I wish those men that attended the State Dental Society and listened to a paper read by a gentleman from Massachusetts, in which he opposed the dental hygienist, could have been



here tonight and could have seen these pictures that Dr. Fones showed. I do not think that Dr. Kirk would have any objection to my referring to a letter which I wrote him. In reading the article that was published in the *DENTAL COSMOS* by this dentist in Massachusetts, who opposed the dental hygienist, and the discussion that followed by members of the dental profession in the State of Pennsylvania, I could scarcely believe that it was a present-day issue of the *DENTAL COSMOS*, and I am frank to say that I stopped, turned back and looked at the cover. I thought I would find that it was in 1819, because it seemed to me so ancient, so far in the distant past—the arguments that were brought up against the dental hygienist; and then I went on reading and read some more of this antiquated, out-of-date idea, I looked back at the cover again and still found that it was published in 1919, and then I came to the editorial and my confidence was restored, for I found that I was really reading something that was written at this time.

My friends, the dentists of this country, not if they were ten times the number, could possibly handle this terrible problem of lack of dental and oral hygiene. There are over a hundred million people in America. Realize this, that there is an average of five cavities in the human mouth; that means five hundred million cavities. I only speak of that one aspect. I omit diseased gum conditions and every other dental condition, and only consider the cavity. Consider that there is an average of five cavities in each mouth—five hundred million cavities. Take a half hour as a fair average to fix up each mouth; that would be two hundred and fifty million hours; it would take over one hundred and fifty thousand dentists a year to do that work and there are only forty-four thousand. The dental profession cannot touch it from that aspect. Moreover, during that year look at the crop that would be coming along like the roses in spring; they are coming along all the time because there is summer all over the United States so far as dental decay is

concerned. Go back and read the history of our war and know that those boys of ours that were fighting for you and for me, who were exposed to the dangers and to the cold and wet of the trenches and suffering from the want of food; their power of resistance was often lowered, and what pulled them down? Teeth that had been neglected and the living pulps diseased and destroyed by infection. These fell down first because their efficiency was impaired.

We appeal to all of you to work so that there may be an adequate supply of dental hygienists to carry on the instruction of the public and the children in the public schools, while you and I in our offices are doing the best that we can to repair the destruction that has already occurred; but for heaven's sake, let us get to the help of these little ones with all of the dental hygienists we possibly can and teach them so that they will know that clean teeth and a clean mouth are the gateway to health, and that an unclean mouth and decayed teeth are the gateway to death. (Applause.)

**CHAIRMAN KIRK.** The Chairman of the Committee on Oral Hygiene and Public Dental Education of the Pennsylvania State Dental Society is with us, Dr. Emerson R. Sausser. We shall be very glad to hear from Dr. Sausser.

**Address by Dr. Emerson R. Sausser,  
Philadelphia, Pa.**

Chairman of Committee on Oral Hygiene and  
Public Dental Education of the Pennsylv-  
vania State Dental Society.

*Mr. Chairman, ladies and gentlemen,* In the trenches, according to psychology, a man is reduced to two simple thoughts, the chief one of which is self-preservation. From what has been said here tonight, it seems that the chairman of that committee which has to do with this subject in Pennsylvania is either asleep or reprehensible in having neglected to help or create some interest in Pennsylvania on the subject of oral hygiene. So with a feeling of self-preservation, I will speak with your permission,



Mr. Chairman, personally on the subject and not officially.

Everyone here tonight I am sure deems it a privilege to have heard Dr. Fones, a man who is a pioneer in this work, and whose name will live forever in the pages of dentistry and medicine for the great service he has rendered to humanity in the field of oral hygiene. Anyone who has seen these pictures cannot but be inspired. That which impressed me most was the great possibility of character building among these children. The effect of education and health on these little flowers that are starting to bloom for America cannot be over-exaggerated. The attention to the physical instrument, the body, the violin box, through which the soul must give forth its sound, must not be neglected. Why it is in Pennsylvania we have not a quicker vision, I do not know, but I do know that in Philadelphia we wait and wait; but when Philadelphia does start it does its work right and thoroughly. Such meetings as these are needed to stir up enthusiasm. Dentistry in this State is very far behind in not having conducted a better organized oral hygiene educational campaign through the medium of such meetings as this instead of waiting for the DENTAL COSMOS to make us ashamed of ourselves for our lack of effort. Oral hygiene for the schools and public institutions in Pennsylvania it seems is likely to be taken over by the Health Department of the State, which I personally would gladly welcome. I do not care by what means oral hygiene or the introduction of the dental hygienist in the schools is brought about so long as it is accomplished. Dr. Fones is now able to check up his work and he shows us that in five years he and his assistants have reduced dental caries among the school children in Bridgeport 67 per cent. We all know that this means the saving of human lives and the protection of this country's future; it can be done in this State, and, of course, will be done if we but see the bigness of the principle involved. It looks as if the work must be carried on through the State Health Depart-

ment and through propaganda, along with the co-operation of the Pennsylvania State Society. Our society I am quite sure will gladly co-operate in such a program after some misunderstandings as to the legalization and education of the dental hygienist are clarified. Most of the objections to the hygienist brought up in our State Society, it seems to me, are very much magnified and have been easily surmounted in the other States where the work is being successfully carried on.

It is alarming to think that only 15 per cent. of the people of this country use the toothbrush. What a wonderful nation this will be when oral hygiene is instituted all over the United States. There are 46,000 dentists to a population of more than 100,000,000 people and in our practices today we cannot properly give oral hygiene to our patients, because of the increased demand following the realization of the rôle which dental disorders play in systemic disease. We as a profession and as individual dentists are obligated to take more interest in oral hygiene and see that every child at least is given the chance. I understand that Dr. Finnegan, the head of our educational system in Pennsylvania, is strongly in favor of oral hygiene in the schools; we know that Health Commissioner Martin is at this time building up an organization to carry on the work throughout the State. So it looks as if Pennsylvania, through State officials, the DENTAL COSMOS, and the co-operation of many enthusiastic oral hygienists among the dentists of this State, will eventually give to her people the great benefit of oral hygiene.

CHAIRMAN KIRK. The health authorities and the school authorities of Pennsylvania are profoundly interested in the promotion of the oral hygiene propaganda and its practical utilization in the schools. I am very sorry that Dr. Finnegan, State Superintendent of Public Instruction, was not able to be here tonight, as he anticipated, but is obliged to be absent on account of illness. But we have with us, as Dr. Fin-

negan's representative, Dr. C. D. Koch, Chief Inspector of Schools, Department of Public Education, who will speak on this subject.

**Address by Dr. C. D. Koch,**

Chief Inspector of Schools, Department of Public Education, Harrisburg.

*Mr. Chairman, ladies and gentlemen,* I was wonderfully struck with the magnitude of the program as presented tonight by Dr. Fones. I am also struck with the great possibilities of this program which has been submitted to us. It presents to me a great piece of work for us to do. I am here representing the Department of Public Health because Dr. Finnegan can't be here on account of illness, and because none of the deputy superintendents can be here. I am here merely to assure you, or to assure your Chairman and those working with him that the Department of Health and the Department of Public Instruction are with you in carrying out this great program. Dr. Finnegan has expressed himself to me on a number of occasions that he is deeply interested in this great health program, and if any of you had attended the Education Congress during the month of November, you would have some idea of the big things we have organized in regard to the question of health. I have been interested in this question for twenty years, personally interested in it, interested in it as a public school teacher, and now as a member of the State Department of Instruction I have a larger interest in it. Ultimately you will find a great deal in the course of study dealing with hygiene, and especially the hygiene of the mouth and the teeth. I can't discuss that and do not intend to, but I want to assure you that I have been deeply interested in it. I taught

hygiene and physiology for a period of eight years, and I know all about that phase of it.

The Department of Public Instruction is intensely interested in getting the 45,000 teachers in Pennsylvania educated into this very thing that you are trying to accomplish, and we want to develop with our two million dollars a course in the public schools of Pennsylvania that is to become bigger. We are with you; command us as you can.

CHAIRMAN KIRK. You will notice at the head of the program that the purpose of this meeting is to assist in giving effective direction to the oral hygiene movement, and we have asked dentists, doctors, physicians, sanitarians, and representatives of public health service to express their views about it. It is a problem that is universal in its application, for it applies fundamentally to the question of the bodily health of the individual and that of the general public. It has been regarded too much as being a dental problem, that is to say, a problem of the dental profession. It is a problem that belongs to all of us, and to give effective direction to this movement by this meeting means that we must get together on the question as a measure of public utility and have right views about it. The hour is getting late. I should like to call on a number of people that I have had my eye upon: Dr. Harry Baker, Dr. J. Madison Taylor and Dr. Mershon. Dr. Mershon represents the Municipal Dental Clinic in Philadelphia, and I just recently had an opportunity to go over his work there, and I want to express by most unqualified approval of what is being done by Dr. Mershon and his corps of assistants in the Municipal Dental Clinic and its branches in several of the public schools.

The meeting adjourned.

## New Jersey State Dental Society.

**Forty-ninth Annual Convention, held in Atlantic City, N. J.,  
July 16 to 18, 1919.**

(Continued from page 239.)

### THURSDAY—*Morning Session.*

President Wakeley called the convention to order at 10 A. M.

The PRESIDENT. Owing to the interest in the election of officers of the society for the ensuing year on which the balloting is now taking place, and in view of the fact that the business of the convention can very well be transacted tomorrow morning, the Chair will entertain a motion to adjourn this session until this evening at 8 o'clock.

On motion, duly seconded and carried, the morning session of the convention adjourned until 8 P. M.

### THURSDAY—*Evening Session.*

President Wakeley called the convention to order at 8 P. M.

The PRESIDENT. I will call upon Dr. Fowler to report the returns of the election of officers of the society to serve for the ensuing year.

Chairman FOWLER. The Board announces that the following were elected:

*President*—John C. Forsyth.

*Vice-President*—S. Irving Callahan.

*Secretary*—F. K. Heazelton.

*Treasurer*—Charles Faupel.

*Members of the Board of Dental Examiners* (recommended by the society)—Raymonde A. Albray, Benjamin F. Leonard, Arthur R. Slade, R. B. Van Gieson, George M. Holden, and Walter J. Webster.

*Trustees*—M. P. Shoemaker, W. A. Tracy, R. S. Hopkins, R. B. Van Gieson, Chas.

Faupel, J. I. Woolverton, George McLaughlin, F. L. Manning, C. A. Rice, C. M. F. Egel, W. H. Gelston, L. R. Fretts, A. Percy Roberts.

The PRESIDENT. You have heard the announcement of the judge and inspectors of election and I declare the officers whose names have been called duly elected to serve for the ensuing year. Installation of officers will take place at tomorrow morning's session.

Dr. CHARLES F. JONES moved that the election of the officers to serve for the ensuing year in the New Jersey State Dental Society be made unanimous.

(Motion carried unanimously.)

The PRESIDENT. I take great pleasure in introducing to you Dr. HENRY C. FERRIS of New York City, who will read a paper entitled, "Mouth Hygiene, Controlled by Diet Through Salivary Analysis."

[This paper is published in full at page 453 of the present issue of the DENTAL COSMOS.]

### DISCUSSION.

**Dr. Louis C. Le Roy**, New York City. From my own viewpoint, the lack of hygiene of dietetics and our meager knowledge of physiological chemistry are fundamentally the cause of most oral disturbances. In a paper read before the Susquehanna Society at Easton, Pa. some time ago, I tried to emphasize what to me is a fact, namely, that the hygiene of dietetics does play a great part in the establishment of oral diseases. But physiological chemistry is the balance



wheel, the understanding of which must revolutionize the practice of medicine and allied sciences and our mode of living, and incidentally establish a standard for better living and health.

Dr. Ferris has told you that physiological chemistry is basically the study upon which he has founded the conclusions he has presented. There is so much more to the subject than appears from a reading of his paper that a study of it will interest many of us and scientists or those who are seriously considering the continuing of such work as he has gone into. I believe the only way in which these problems can be solved will be through physiological chemistry, and as part of our work we must start with an understanding of the physiological chemistry, of the function of saliva, and of the various other functions and secretions that enter into the problems that deal with dietetics. That will take us far afield from dentistry, but there are those within our ranks and without capable of studying these problems.

Physiological chemistry, the chemistry of dietetics and the hygiene of dietetics cannot be dissociated; they must be studied together. They are problems for the dental scientist and for the medical scientist, for medicine is part of dentistry, and dentistry is part of medicine.

If it is not wholly so now, it will be as necessary for the dentist of the future to understand physiological chemistry and the hygiene of dietetics as it will be for the physician. Their fundamental knowledge will be the same; the only difference will be that their practices will be specialized. Scientists in other fields of research—chemists in particular—have intimated to us that they suspect that, instead of the many elements which go to make up this complex, composite world of ours, it may be discovered some day that there is but one primordial element.

Using that as an analogy, may it not be possible for dental and medical scientists, who suspect it now, to determine it to be a fact that the many departures from the physiological normal from which humans now suffer can be trace-

able to a simple cause—unbalanced physiological chemistry. We are very much indebted to Dr. Ferris for his scholarly, comprehensive paper, the result of years of labor and research and more years of observation and study.

**Dr. Theodor Blum**, New York City. I hope I am correct in assuming that Dr. Ferris does not want to convey the idea that each one of you should practice in this particular field of endeavor—in laboratory work. And this brings up the point again, that dentistry cannot be practiced today as such, that is, that a man cannot practice in all the specialties of dentistry and be competent and efficient in each. For that reason I think it is just about time that we recognize the different specialties. Take Dr. Ferris' work for example. He practices a specialty that we take advantage of by making him our consultant. Whenever a special case presents itself, then it is proper that we see the specialist and take his advice. I believe if Dr. Ferris were kind enough to offer his services to train certain dentists in the different cities, if he should find men interested in the work, that a large percentage of patients could take advantage of this particular method.

**Dr. S. DeSola**, New York City. The points brought out by Dr. Ferris in his paper seem to be epoch-making in dentistry. Of course there are books that have enlarged upon this point a great deal, but it seems to me as far as this paper is concerned it applies particularly to dentistry in so far as mouth hygiene is concerned, and it is epoch-making. In the past we have been in the habit of examining the patient without attempting to find out what products were digested or what were not digested, and not going into the special kind of food or materials or the functions of saliva which would help in the digestion of food. It seems to me about time some care should be given to proper and well-balanced rationing, as it were. We have among the lower animals the horse and cow, and you well know that the veterinary takes great care and does not feed that horse or that cow two or three kinds

of food, but gives it so much corn or oats, hay, and water, observing a certain balancing of the rations, and if that is done, as it usually is, that animal will keep in good condition. Besides, I believe that the cow is usually given a place where she can get a proper amount of sunshine and air. But the human race is different; people do as they please. They start their meal by taking a glass of cold water, then swallow hot soup, and top that off with some radishes; then mix that up with some olives, a few raw oysters, then a little punch and some chicken or roast beef and potatoes; and a lot of other stuff, some of which is hard and some of which is mushy. People seem to prefer to eat mushy food; they do not take enough of the hard foods that create a flow of saliva and they eat rapidly. We frequently go to places to eat where there is a lot of clattering of dishes and excitement, which makes it impossible for us to be in a mental condition to eat quietly. All these things tend to disturb the digestive function. These are, to my mind, the causes for so much dental disturbance in a direct or indirect manner. I do not say exactly that you should not eat a mixed diet, but in my mind it should be and it must be balanced to a certain extent so as not to produce a bad mixture in the stomach. As Dr. Ferris has pointed out, by examining the saliva it will show the quality of the secretion, and by examining the feces it will show the quality of the excretion, and by comparison of these two examinations we devise means for balancing our diet.

**Dr. Bertram B. Machat**, Brooklyn, N. Y. It is a long time since some of us have swallowed the "proximate principles" of our college days, by now I fear not only assimilated but eliminated, so that Dr. Ferris' timely topic of this evening in which he correlates diet, salivary secretion, oral fluid, and caries is as refreshing as it is instructive.

It appears that salivary secretion, although of vast significance to the dentist, has hitherto remained purely an academic subject. Aside from the importance of saliva as an auxiliary in the

maintenance of body balance, we know its influence as an inhibiting agent of dental caries both by way of lubrication and neutralization. This alone should be sufficient argument for intensive study of the subject. This evening Dr. Ferris opens to us a new field of interest, namely, the introduction of salivary analysis as a diagnostic measure. As has been stated by the essayist, salivary analysis can be relied upon as an index to normal oral fluid as well as for the control of diet. Again, diet, Dr. Ferris tells us, is capable of modifying oral fluids, which in turn play an important rôle in connection with dental caries. This physiological cycle, to my mind, is a splendid example and added proof of a point which I have made elsewhere, that correct diagnosis is the basis of our practice.

Until recent years diagnosis as a subject *per se* was an "unknown quantity" in dentistry. Then came the revelations concerning mouth sepsis, and the dentist found himself in the position of a healer rather than an artisan. Conjecture and empirically gained information had to give way to careful diagnosis based upon scientific proof. The X-ray, electrodiagnosis, the bacteriological test tube, the histo-pathological slide, blood findings, and, thanks to the essayist, salivary analysis, are now the agencies that demonstrate the usefulness of dentistry, and the wonderful opportunities that these developments have placed in the hands of the dentist should be utilized. Obviously, as Dr. Blum has pointed out, we cannot all be masters of every art, yet we must realize our responsibility and freely consult upon matters requiring specialized training.

Dr. Ferris, as I understand it, ascribes most of the pathological lesions in the oral cavity, and especially caries, to various constitutional conditions arising from faulty diet. Undoubtedly his many years of profound study along these lines warrant such sweeping statements. We readily concur with Dr. Ferris regarding this viewpoint, except as to degree, Saliva, as we know, is an inconstant factor, its quality and quantity being af-



fects by stimuli, due to manifold primary causes of pathologic, physiologic, chemic, mechanical, and psychic origin. To the influences of faulty metabolism can be ascribed many ailments to which flesh is heir. But there are simple, concrete, primary etiologic factors, which so far as oral pathology is concerned must be considered—notably, oral sepsis, ill-fitting appliances, lack of mouth hygiene, etc. Indeed, frequently we may reverse the cycle—faulty mechano-dental contrivances, hyperemia inflammation, sepsis, impaired metabolism, altered oral fluids, etc.

Withal, I feel that Dr. Ferris' paper contains a wealth of information and a sound guide to a practice which should be of equal interest to the dentist and to the general practitioner of medicine. Incidentally we have here a fine example of the overlapping of the services of the oral specialist with that of the internist.

**Dr. A. M. Nodine**, New York City. Mr. President, I would like to have Dr. Ferris point out in addition to the subject covered by his paper the significance of the deposits and stains upon the teeth, as I believe there is a great deal to be said along that line. The possibilities in the field of research which Dr. Ferris has brought out are so great that I am not able to grasp it at the present time, nor do I believe that any of us are able to grasp all the possibilities of the research which he has undertaken. I think it will develop a line of treatment which will bring about a closer co-operation between the dentist and the physician. It is opening a new specialty, a new department of work, and I agree with Dr. Blum when he said that we should have specialists in this kind of work in large and small cities to whom our dentists can send patients for diagnosis of the conditions and troubles of the mouth. This advice and course of treatment will be beneficial to those who have the care of patients with defective dietetic habits. If that is done, I think it will correct a great many things the causes of which have puzzled us.

**Dr. Ferris.** In answer to Dr. Blum's questions, I wish to say that I believe in a liberal interchange of ideas of special-

ists in their scientific efforts. I have been greatly encouraged by such co-operation and reciprocation. In answer to the question in reference to education of other men in other cities in this field of scientific experiment, I will say that I am willing and ready to help any who are interested. For the last ten years I have talked on this subject, and published my methods in detail. I have spent a great deal of time at no little expense upon this work, as it has always been my hobby. I can readily understand that it is impracticable for all men to carry out this practice; it is big and complex, but a single city or town could maintain a man interested in this field, and he would be of great service to his community and make his labor profitable, if he had the support of his society.

Dr. DeSola's remarks in reference to analysis of other secretions of the body as they bear on salivary analysis are very important. In fact, any pathological help of that kind should be used and recorded. There are about three laboratories in the City of New York that can give a quantitative analysis of urine. It takes three days for a report, and their fee for such an analysis is not less than \$25, which is very reasonable for the time expended.

There are very few specialists who spend this amount of money to gain their information, however. I have reported one case in dental literature which cost me \$250 for the analysis alone, and I cured the boy, when six of the leading specialists of New York had failed after two years' effort.

Dr. Machat spoke of the ductless glands; of course the influence of diet on the ductless glands is too deep a subject to take up at this time. There is little doubt that the ductless glands exert a great influence on the salivary secretions, but our authentic data on this subject is very meager at the present time.

Dr. Chandler spoke of stomach analysis, and of the necessity of the education of specialists in order that physicians may come to them for advice—that time will come, when the dental specialist will be competent. Specialists are called upon



only in extreme cases that do not respond to ordinary treatment. This is regrettable, but true. Some of the most prominent stomach specialists consult me, particularly when treating their professional friends, and I have had the satisfaction of being of service to everyone who has applied. The stomach specialists frequently have difficulty in accounting for excessive presence of salivary mucus in the gastric secretion. I have assisted several in this difficulty. Some specialists have failed to recognize that the pancreas must be overworked in cases of malocclusion or where the molars are missing; and they have acted upon my suggestion, and have had the malocclusion reduced or missing grinding surfaces supplied. One of the gentlemen spoke about the balancing of the food. What do you mean, Doctor, by the "balancing of the food?"

**Dr. Machat.** I have come to the conclusion that the stomach and salivary glands because of not being stimulated do not produce the proper digestive fluids. For instance, the use of pepsin as an aid to the digestive apparatus where a fluid was needed would put weight on the patient. Here is the point: Would not a balancing of the food remedy that condition?

**Dr. Ferris** (closing the discussion). Your idea is fundamentally at variance with my method of procedure. You are now arguing from the medical standpoint. My method of treatment eliminates medicine. That introduces one point which I did not emphasize sufficiently in my paper. You say your adding pepsin is a help temporarily to the gastric secretion. My help comes through nature's functional activity and the normality is one hundred per cent. The proper functioning of any organ means help, but if the stomach is so broken down that it does not produce its normal quantity of gastric juice, you may liken it to a mouth without teeth; and if you put the food through a ricer you reduce the function of mastication and the normal flow of saliva which should result therefrom.

My theory is to endeavor to interpret

the pathological conditions of the saliva so as to produce a rest to those glands which secrete certain properties that are below normal in the analysis, by the elimination of nerve reflexes which cause these glands to flow. For instance, if a specimen shows a low ptyalin content, I would eliminate from that patient's diet for a period, the bulk of carbohydrate food that he was accustomed to consuming; or until we found the ptyalin returning in the secretion. Likewise, in the treatment of gastric disturbance from lack of pepsin, I would eliminate all proteid substances for a like period.

My method of balancing foods is based upon the number of inclined planes of the molar teeth in occlusion as compared with the number of premolar and cuspid inclined planes in occlusion. The former representing the ability of the organ of mastication to reduce carbohydrates, and the latter its power to reduce proteids. For illustration: If you examine patients who are minus molar teeth on both sides of their jaws, you will find that they are not fond of potatoes as a diet, etc. If they are minus their premolars they are not fond of oysters or eggs.

Dr. Nodine spoke of tooth stains. No doubt he referred to the work that was done by Dr. McKay on the Indian children. I believe those stains are due to metallic salts. I have no way of proving my belief, however. The data that have been supplied are only rudimentary. Dr. McKay examined a number of Indian school children under a great deal of difficulty and has been unable to follow up his investigation owing to lack of time. I am confident that these stains form from the interior rather than as the result of the environment in which the teeth are living.

I thank you very much for the enthusiastic interest you have shown in my work and wish to assure you that I have had a very enjoyable evening.

Dr. Wharton moved that a rising vote of thanks be tendered to Dr. Ferris for his paper as well as to those who dis-

cussed it. (The motion was seconded and carried.)

The following telegram was received from the President-elect Dr. John C. Forsyth by President Wakeley and was read by Acting Secretary Barry: "Telegram just received over telephone. Many thanks for sentiments expressed. Please convey to members my appreciation and promise to serve them to the best of my ability, at the same time asking for their support and assistance."

(Signed) John C. Forsyth.

Adjourned until Thursday morning.

#### THURSDAY—Morning Session.

President Wakeley called the Convention to order at 10 A.M.

President Wakeley introduced to the Society Mr. F. J. ATKINS, County Chairman, Treasury Department, War Loan Organization, who addressed the Society on the Liberty Loan.

PRESIDENT WAKELEY. I take great pleasure in introducing to you Dr. CHARLES K. BUELL, of the University of Buffalo, College of Dentistry, who will read a paper entitled "The Technique for the Construction of a Hand-carved Porcelain Shell Crown."

[This paper is published in full at page 437 of the present issue of the DENTAL COSMOS.]

#### DISCUSSION.

Dr. Arthur J. Norman, Detroit, Mich. A paper on porcelain work by Dr. Buell published some years ago was one of the most comprehensive papers on modern carved porcelain-jacket construction that it has been my pleasure to read. A great deal of the technique that we now teach in the Detroit Clinic Club was derived from that paper. Although I have never before had the pleasure of meeting Dr. Buell personally, I have always looked upon him as an authority in this line of work. The technique as given in Dr. Buell's paper this morning varies but little from the

technique that I am showing in my clinic here.

There are just one or two points which I wish to bring out in which I differ from Dr. Buell's technique. In the matter of removal of enamel, I find that the scoring or division of the enamel into small sections between grooves cut through the enamel at the gingival line and the incisal edge, greatly facilitates the removal of enamel by the means of cleavers. These grooves are cut with knife-edged Miller stones. They are cut through the enamel just to the dentin, and if the enamel is divided into small enough squares by longitudinal and transverse grooves, it scales off almost as easily as one can scale a fish. The remaining enamel above the groove cut at the gingiva can then be removed very easily by small specially made cleavers, so that the tooth is entirely denuded of enamel both above and below the gingival line very quickly and with little or no laceration of the gum tissue. The use of cleavers is something that dentists have been getting away from too much. We have been relying too much on our engines and particularly in this work we find the cleaver much the best instrument to use. I thoroughly believe in the removal of all enamel, for if any of the enamel is left above the gingiva it will disintegrate and break off in a year or so after the crown is set.

The indirect method is used in every step of the work. The technique of taking impressions for the model is the same, with the exception that the copper band is filled flush with compound, and band and compound carried over the tooth together. The compound adheres to the edge of the band that goes under the gingival margin, and is automatically carried into place over the shoulder without exerting the pressure that is necessary in trying to force compound into a band that is already placed over a tooth. This not only insures a perfect impression at the first trial, but is also much more comfortable for the patient. I do not use a cornucopia on anterior teeth, but use a tin-lined modeling compound impression of the lingual surface



of the tooth before it was cut down as a model in which to pack the porcelain. After the second bake this gives me in porcelain an exact reproduction of the lingual surface of the tooth as it was originally. This method I shall demonstrate in my clinic. It is very simple and has proved to be very successful in my hands. If the lingual surface is faithfully reproduced, the occlusion must be correct. On the labial surface I prefer to spatulate my colors, as I feel I can get the colors exactly where I want them in that way. We use a paper cornucopia a great deal in posterior cases. In those cases it is also necessary to have an exact bite and articulation with the occluding teeth.

The work that Dr. Buell has done has been of great assistance to us in working out our technique, and I think a great deal of our technique, for which we claim no originality, was taken from Dr. Buell.

**Dr. N. B. Nesbitt**, Boston, Mass. I can say very little on porcelain-jacket construction. I can look back as much as twenty-one years ago when a good friend of mine was very enthusiastic over porcelain work; and I have seen the upgrowth of the very much decried, at that time, porcelain jacket. As a restoration, I have seen it come into its own as a stable, logical and most beautiful method of construction.

Possibly Dr. Buell and numerous others of you here can well remember the clinics where we have heard men say that porcelain jackets were too frail. They said, "Those porcelain teeth will never stand without breakage, and it is an outlandish method." They claimed that a gold cap was the only thing where we wished to restore the contour of the tooth. Yet, see its place today!

There is very little on the point of technique for me to talk about, as I have done but little of this work myself. However, I am interested to note that most of the jacket crown men do their work by the indirect method. As I have been an advocate of the indirect method in gold inlay restoration work, I am pleased that mine is not such an old-time method after all. The pioneers of the

work started in with the direct method, as we all did with the porcelain and gold inlay, and I have seen some beautiful results from the jacket crown standpoint.

There is one little point I would like to ask Dr. Buell and that is, whether in his experience he has found that the covering of the tooth with a layer of porcelain has anything to do with the breathing of the tooth. I am asking this question because Dr. Herman Chayes of New York has written in his book that no tooth should be covered with a porcelain jacket restoration because it cannot breathe. I will ask Dr. Buell if he has found any difficulty about a tooth breathing when it is covered in that way with porcelain.

I would also like to ask Dr. Buell about another point. I did not get Dr. Buell's technique on how he gets his relation between the amalgam die and the other teeth on the model. If I understood him correctly, he puts the die back into another impression. Is that right? And is there not some little chance there for a slight change? I ask this for my own information.

**Dr. Buell** (closing the discussion). Dr. Norman in his discussion has seen fit to comment upon my work most favorably, but I wish to say that you may see in Dr. Norman's clinic beautifully demonstrated, with a slight difference in technique, the construction of crowns we have been talking about. I am quite certain he has not taken anything from me, as he mentioned, as I do not claim originality in any of this technique. I have simply brought together different methods, using those that helped me most and discarding those that did not seem to be useful.

In answer to the question about cleaving the enamel at the cervical shoulder, I have never seen a case where the enamel has broken away at the cervix after a crown has been placed, hence I do not see the necessity for its removal.

We are frequently called upon to repair a tooth, a large portion of which has been broken away by some accident, and there is no crown better suited to



such a case than the porcelain shell crown.

Sometimes teeth that have been broken by a hard blow eventually succumb to that injury and the pulp dies. In such a case, the crown may be opened up the same as any normal tooth, and the root properly treated and filled without any injury whatsoever to the crown.

Dr. Nesbett asks how, in the direct method, I am certain that the relation between the amalgam model and the adjacent teeth is correct. I think I hurried too fast at this point, as I did not make it clear that two bands were used, one of them which comes off in the impression, being the impression of the stump into which the amalgam model is placed before the impression is run.

In making the second application of porcelain, you will remember that I coated the matrix with shellac so that the porcelain in shrinking drew away from the shoulder. This opening or ditch is now filled with porcelain, mixed

very thick, jarred until all moisture is removed, and then fired.

Dr. BARRY moved that a rising vote of thanks be tendered to Dr. Buell and to those who have taken part in the discussion. (Motion carried.)

The next order of business was the report of the Committee on the President's Address, which was read by Dr. Manning, Chairman, and on motion adopted.

President WAKELEY. As there is no other business to come before the society, the next order of business is the installation of officers. Acting Secretary Dr. Barry read a message from the president-elect, Dr. Forsyth, who was unavoidably absent.

The other newly elected officers were duly installed and on motion, the convention adjourned *sine die*.

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## The Eastern Association of Graduates of the Angle School of Orthodontia.

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Tenth Annual Meeting, held in New York City, May 5 and 6, 1919.

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(Continued from page 394.)

TUESDAY—*Morning Session.*

(Continued.)

Dr. HELLMAN. I move a rising vote of thanks to Professor Boas for his lecture. (The motion was carried.)

The next item on the program was a paper by Dr. MILO HELLMAN, New York City, entitled "An Interpretation of Angle's Classification of Malocclusion of the Teeth, Supported by Evidence from Comparative Anatomy and Evolution."

[This paper is published in full at page 476 of the present issue of the DENTAL COSMOS.]

### DISCUSSION.

Dr. W. K. Gregory, New York City. I can hardly add anything to Dr. Hellman's paper, and perhaps my point of view is somewhat prejudiced in its favor by my connection with this line of work; but I would like to confirm Dr. Hellman's statement in regard to the fundamental and far-reaching char-

acter of the occlusal relation of the cusp that we call the protocone with the central fossa of the lower molar. This occlusal relation is the common property of the placental mammals of many different families that are found when our geological record first becomes clear in the Eocene period. When we come to the primates, as Dr. Hellman intimated, we find this fundamental relation still holding good. It even holds good in man at the present day, and it would seem to be a convenient and easily remembered point of departure for any variation—the fundamental interlocking of this cusp in the upper molar with the fossa of the lower molar.

In these primitive types of teeth, cusps do not occlude with cusps; they occlude in spaces or fossæ of the lower teeth.

I would be disposed to amend a little Dr. Hellman's statement that the buccal sides of the teeth in primitive mammals receive various additions. These projections on the buccal side of the teeth are by no means additions or things which are peculiar or special. In the oldest Eocene orders of mammals the external cingulum gives rise to these accessory structures, and some authorities have held that they are the oldest part of the molar teeth. That is another problem in itself; but that these external or buccal excrescences are an old part of the teeth I think all palæontologists would agree. In the earliest Eocene primates we find upper molars fully equipped in this way and with this mesio-buccal projection.

When we come to the higher primates, including the Old World series, culminating in the anthropoid man series we find a secondary reduction of these buccal excrescences and I think the comparative anatomical and palæontological record indicates that where we have the paracone and the metacone on the buccal side of the molar teeth it is due to the atrophy of the cingulum and its products; it is a reduction phenomenon and not a primitive function. But while we have this degenerate or reduced condition on the buccal side, on the lingual

side we have everything in its primitive occlusal relation, not only the protocone but also the posterior cusp or phrycone, which is a secondary cusp. It is all precisely as we find it in the anthropoid apes and in the primates at large; so the lingual side is the less disturbed of the two, and would be a convenient fundamental point of departure for the consideration of abnormal relationships.

**Dr. C. A. Hawley**, Washington, D. C. I think these papers and this investigation are exceedingly interesting as compared with practical and technical experiences. I think it is our universal experience that many former difficulties in the establishment of what we have called the mesio-distal relation have been due to overlooking these very things which have been described by Dr. Hellman and Dr. Gregory. It has been my conviction in later years that in former methods of correction of the mesio-distal relation we were trying to force a relation. For instance, with the intermaxillary elastics, so-called, we attempted to force a correction of the mesio-distal relation, which simply needed the careful adjustment of the cusps of the teeth to take place itself. I do not suppose there is anyone present who uses one-quarter of the number of intermaxillary elastics which he did ten years ago, for the reason that he adjusts the relation of the cusps more accurately.

I have referred to that in a paper—that such means of correcting and retaining the mesio-distal relation would not be necessary, if all conflicting relations were removed. That has come about not only by a more careful study of these relations, but also we have more accurate means of rotating teeth. That used to be one of the most difficult things we did. If you look through the literature of orthodontia of ten or fifteen years ago you will see what ingenious things and complicated appliances we had for rotating the molars. At the present time it is one of the simplest things we do, and with that improved technique and better understanding, many of the difficulties of correcting and retaining the mesio-distal relation will



disappear. It is a very interesting thing to note the correlation of scientific investigation and practical experience.

I might make one suggestion, which would have a great bearing on the improvements in operative dentistry, that is, I have found many difficulties were removed by the correction of some very bad fillings which did not permit of an accurate adjustment of the cusps of the teeth. The difficulty seemed to disappear very quickly when some bad operative dentistry was corrected.

**Dr. R. H. W. Strang**, Bridgeport, Conn. From the trend of the discussion it would seem to be the consensus of opinion that Dr. Hellman has introduced an entirely new basis from which to classify our cases. In this I do not agree nor do I concede that it is a radical change to advocate the observation of cusp relationship on the lingual side of the arch instead of on the buccal side. When we learned normal occlusion we were taught to study the relation of *every* cusp, buccal, lingual, mesial and distal, to every other cusp and fossa. If we have been superficial in our observations, and no doubt all of us have been from time to time, and studied our cases from the buccal aspect only, we have not been living up to the fundamental principles laid down by our teacher, and necessarily many mistakes have been made as a result of such neglect.

From a mechanical standpoint it would naturally follow that the mesio-lingual cusp of the upper first molar would be the last cusp to lose its proper relationship owing to the fact that it is surrounded by the four cusps of the occluding tooth, so that every one of its inclined planes is under the influence of an opposing force, whereas the other cusps of this molar are governed by only two inclines each. Controlled by this strong retaining force the tooth tends to rotate, using the mesio-lingual cusp as its axis, and so preserving the normal position at this point to the last possible moment, which may be long after the other cusps are well out of normal occlusion. The importance of Dr. Hellman's paper, therefore, lies in the fact

that he has brought proof to the minds of all of us that we have been superficial in the study of many of our cases, a thing that we should ponder over most seriously. On the other hand his statements have not changed the basic principles of the classification of malocclusion in any way.

One other point I would like to touch upon. In our papers and discussions we are apt to be careless in the use of terms. We often refer to the classification of malocclusion and the diagnosis of malocclusion as one and the same thing. This, I believe, is an error that should be avoided, for they are two separate and distinct steps in the analysis of our cases. A case must be first diagnosed before it can be classified. In the process of diagnosis many factors must be taken into consideration other than the cusp and tooth relationship. This study must include, as you all know, the general condition of the patient; his osseous and muscular development; a study of his respiratory tract; his nervous system with special reference to co-ordination and habit; his facial lines and various other important factors bearing upon his deformity, as well as a study of his occlusion. When, after such a comprehensive review of the subject, a *diagnosis* of malocclusion is made, the next logical step is the *classification* of the type of deformity, which procedure is accomplished by studying the cusp, tooth, arch and jaw positions. The classification, therefore, is a secondary step and follows the establishment of a diagnosis. A parallel may be drawn in the diagnosis and classification of certain diseases as, for instance, pneumonia. Certain general symptoms associated with local signs, within the lungs decree that a pneumonia is present. The diagnosis having thus been made, a classification of the type of pneumonia, I, II, III or IV, is in order. If this difference is borne in mind it cannot be justly argued that the Angle classification of malocclusion should be discarded because it does not take into consideration the various correlated factors necessarily involved in the formation of a diagnosis.



It never was intended for this purpose. It occupies a stage of tremendous importance, intermediate between diagnosis and treatment, influencing the latter from start to finish, and its position is most tenable and indispensable.

**The President.** It seems to me Dr. Strang has picked up the thread of the question. The important thing to my mind, is that scientific evidence has permeated some of our ideas on this question, and the philogenetic evidence is perhaps more valuable than our observations or mechanical means of observing the teeth.

**Dr. Oscar Carrabine,** New York City. I think the principal value of Dr. Hellman's paper is bringing more attention to the lingual cusp; but I believe at this period in orthodontia, to consider any radical change in classification is a very serious mistake. It took Angle a great many years to get some classification that would be acceptable to the profession, and as long as that has been accepted, and is so simple, I believe to try to make any change in the general classification is a mistake.

I realize and we all appreciate the importance of drawing attention to that phase to which we have not perhaps given sufficient observation; but we will from now on, I am sure, after hearing Dr. Hellman's paper.

**Dr. A. L. Johnson,** Boston, Mass. It seems to me there are two parts to Dr. Hellman's paper. First, the classification of malocclusion and, second, the evolution of the lingual cusp.

The question of the classification of malocclusion as a basis of diagnosis is well taken. I do not think, in the light of what orthodontia itself is, that it can be taken as a basis of diagnosis. Dr. Hellman does not advocate a radical change in classification. He has merely defined classification and diagnosis very clearly. Orthodontia is really the science which treats of the forces controlling the form of the dental arch.

Dr. Hellman showed Class II, Division 1 cases that respond to treatment in entirely different ways. If the occlusal relations indicated the nature of the case, then we would be able to an-

ticipate from the nature of cusp relation the forces with which we are concerned in treatment. The cases cited are evidence to the contrary.

The classification I do not think Dr. Hellman intended to change or question. It is a part of our terminology. When we speak of a Class I case, or Class II, Division 1 case, we speak of the occlusal relations of the teeth. We do not convey an idea of the nature of the forces which maintain that relation. Of course, to a certain extent it is a diagnostic sign. The occlusal relations are one of the forces controlling the forces of the arch. However, it is not potent enough in the human denture of the present day to constitute our sole basis of diagnosis and treatment. The classification is a part of our nomenclature.

**Dr. Hellman** (in closing). I think Dr. Johnson answered most of the questions to my entire satisfaction. What I wish to add is that I did not intend to start any revolutions nor to promote any orthodontic Bolshevism. I just wanted to make clear certain points and convince you that in classifying cases of malocclusion it is necessary to adopt certain landmarks that are of evolutionary significance, which are maintained in all placental mammals including man at the present time. The classification is all right as it stands and the diagnosis is all right, but the two must not be indiscriminately interchanged.

As to what Dr. Gregory said, I will not take exception. Relative to the character of the buccal accessory developments in the molars, I do not know the nature of them. I simply meant to say that the various buccal accessories in the dentitions of the different orders of mammals simply tend to obscure the view of their relationships when the teeth are in occlusion, in contradistinction to that on the lingual aspect, which always is clearly discernible and retained in its primitive form.

In conclusion I want to acknowledge my indebtedness to Dr. Gregory for the most willing and gracious way in which he assisted me in the investigation of this and other problems.

Adjourned to 2 o'clock P.M.

# THE DENTAL COSMOS

A MONTHLY RECORD OF DENTAL SCIENCE.

*Devoted to the Interests of the Profession.*

EDWARD C. KIRK, D.D.S., Sc.D., LL.D., *Editor.*

L. PIERCE ANTHONY, D.D.S., *Associate Editor.*

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PHILADELPHIA, APRIL 1920.

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## EDITORIAL DEPARTMENT

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### Dentistry and the Public Health.

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WE print in this issue the report of a symposium upon Oral Hygiene in its Relation to the Public Health in which is recorded the views of a number of representative public officials as well as of dentists who from large experience and study are eminently qualified to speak authoritatively on the subject.

Reduced to its lowest terms, the symposium is an emphatic expression of the widespread demand for oral hygiene service sufficient to the public need and of the insufficiency of dentists qualified to render the service required. The problem is a vital one, vital to the welfare, the future status and usefulness of the dental profession.

The present situation is a critical one as the determination of our professional attitude toward its solution cannot fail to have an important bearing upon the status of dentistry as a humani-

tarian service. Moreover, the present critical situation is largely of our own making, for it is the dental profession that has forced the issue by a continuous propaganda of education as to the general health relations of the oral cavity and a persistent demand that the importance of that relation shall be properly recognized.

It is recognized now by the medical profession, by educators, by the management of industrial corporations, by the administration of the Army and Navy and by a large section of the general public, which in their totality have created a demand for dental service greater than the dental profession can under present circumstances render. Not only is the present quota of dentists insufficient to meet the existing requirements but the total annual output of the schools is inadequate to keep pace with the normal increase of the demand for dental service. It is not here necessary to further elaborate the factors which have brought about this situation nor to present the data upon which the foregoing statement is based, as it is amply supported by statistics. What is of vital importance is that we should recognize the difficulty and in the light of the facts organize a plan that will promptly and adequately meet the requirements.

The case in Great Britain is interesting for the reason that, while analogous to our own, it is more acute, for which reason it has become the subject of official investigation, and measures have already been reported for relieving the situation due to the insufficiency of dentists. Among other things, it is significant that proposals are there under consideration looking toward a rearrangement of the dental educational curriculum with a view to increasing the annual output of qualified dental practitioners.

It is highly probable that a similar review of the standard dental curriculum of American dental educational institutions will become a necessity for the same fundamental reasons that have compelled consideration of the dental educational problem in Great Britain. But it is not alone the deficient capacity of the dental schools as viewed from the standpoint of supply and demand that makes such a review urgently necessary. The evolution of dentistry as well as of medicine follows the general biologic law of development, from the simple and homogeneous to the complex and heterogeneous. The accretions of knowledge within the scope of dental interest and activity advance in arithmetical progression,



or at any rate so rapidly as to bring about a condition of congestion if not stasis in the dental curriculum, which at any given period may have been properly adapted to the ends for which it was then devised and organized. With the increase of knowledge, the curriculum tends to become more and more complex until the tendency to split up into specialties becomes fixed as a necessity. In the meantime, the day of reorganization upon rational lines to meet the new situation is postponed by the temporary devices of lengthening the course and by increasing the difficulties of admission both of which devices directly operate to limit the output of dental practitioners, a result exactly the reverse of what existing conditions viewed as a whole demand.

A rational solution of the existing critical state of affairs so that the public will receive the service which it is now demanding should involve a frank recognition of the existence of a number of well-defined specialties in and related to dentistry and the organization of an educational system that would provide the specialized training required in each case. As a corollary the specialist should be licensed to practice only that department of the art of healing or its related activities in which he has been trained and honorably certificated. Some fundamentally constructive work is now urgently required of those who preside or assume to preside over the destinies of dentistry in order to conserve the status for which we have clamored, lo! these many years, and which is now abundantly accorded to us, so that the great public may obtain the bread of dental service for which they are asking rather than the stone of professional inadequacy which we are at present offering them.

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#### Death of Dr. J. A. Libbey.

WE regret to announce the death of Dr. J. A. LIBBEY of Pittsburgh, Pa., on March 15, 1920. A full obituary notice will appear in the May issue of the DENTAL COSMOS.

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## PRACTICAL HINTS

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This Department specially welcomes the brief presentation by our readers of any novel suggestions or methods which in their own practice have proved to be time-saving or to possess other features of advantage.

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### Amalgam Carrier.

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By C. R. SCHOLL, D.D.S., Reading, Pa.

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WHILE at college I made amalgam carriers for a number of the members of my class by taking a discarded cone-socket point and swaging a bowl of Chinese metal and soldering the two together.

I have used mine made at that time for thirty-two years and it is still serviceable. Having occasion to make one recently I was looking for some suitable material from which to make it when I came upon a number of discarded mouth mirrors. I instantly saw a form in it

and in twelve and a half minutes fashioned the one illustrated, using only



three appliances: plate shears, flat nose pliers, S. S. W., and sand paper disks.

511 PENN ST.

### Receptacle for Sterile Instruments.

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By B. E. PLESHETTE, D.D.S., Mount Vernon, N. Y.

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PETRI dishes, such as used for bacteriological work, make excellent receptacles in which to keep sterile, hypodermic needles, broaches, burs, gutta-percha points and absorbent cotton points. The fact that the dish is large and shallow and made of trans-

parent glass makes it easy to select just the point desired. The dish and contents may be sterilized in a steam sterilizer, or the contents immersed in an antiseptic solution.

3 WEST THIRD ST.

## The Use of Cotton Rolls.

By R. W. BURCH, D.D.S., Fort Lauderdale, Fla.

AFTER several years' experience as a submarine amalgam worker (speaking of lower molars particularly), I have found that a very simple arrangement of cotton rolls can be made to keep these molars perfectly dry.

It has been the practice to place the cotton rolls horizontally, or parallel with the line of occlusion and in the buccal space. But if a stiff cotton roll (large one) about two and one-half to three inches long (the ordinary six-inch roll

cut in half) be placed perpendicularly in the mouth, say from the upper first molar to the lower first molar, you have a natural brace keeping the buccal walls distended, and with the saliva ejector you have a perfectly dry field. Also you have a very effective but gentle means of holding the mouth open. This is extremely valuable technique, and I would be pleased to see manufactured for this purpose special rolls with a stiff cardboard in the center.

## Vincent's Angina or Trench Mouth.

By G. M. HOFFMAN, D.D.S., Portland, Ore.

VINCENT'S angina or trench mouth, which was hardly known to us prior to the war, has been brought to our attention by the return of our boys from overseas. There are a great number of these cases being treated for pyorrhea and gingivitis and I feel it is about time someone should be enlightened.

In diagnosing these cases one will often confuse it with pyorrhea or gingivitis, but it can be easily diagnosed by the following symptoms: The gums are red, swollen and spongy, a slight pressure on the gums will expel a light yellow exudate, which when examined under the microscope, will give almost a pure culture of fusiform bacilli with their accompanying spirilla. In many cases we find considerable streptococci and staphylococci present. Ulcerated

spots will be noticed near the second or third molars; the roof of the mouth, cheeks, and sometimes the entire mucous membrane of the mouth are involved. The mild types may develop very seriously, accompanied by sloughing and serpiginous ulcers covered with a heavy pultaceous, creamy, often adherent pseudo-membrane. The ulceration may be deep or superficial; many of these types spread very rapidly.

We have been using as a treatment for these cases autogenous vaccine and a 1:2000 solution of salvarsan as a mouthwash and as a spray. This method we have been using very successfully and heartily recommend it in the treatment of Vincent's angina or trench mouth.

EILERS BLDG.



# REVIEW OF CURRENT DENTAL LITERATURE

[*Bulletin National Anesthesia Research Society*, January 1920.]

## The Importance of Blood Pressure Observation in Surgical Prognosis. BY A. H. MILLER.

Speaking before the Providence, R. I., Medical Association, Albert H. Miller, president of the American Association of Anesthetists, drew attention to the fact that the blood pressure is the most valuable single means at the disposal of the surgical team for making a pre-operative prognosis and for judging the condition of the patient during and after operation. It may uncover arterio-sclerosis, nephritis, myocarditis, aortic insufficiency, or mitral stenosis. It registers the ability to withstand hemorrhage, the depression of the anesthetic and surgical shock. Publishing his conclusions in the *Boston Medical and Surgical Journal*, 1919, Miller contends that in the present advanced state of surgical knowledge, the patient has a right to expect a fairly exact pre-operative diagnosis and a very exact pre-operative prognosis. The surgeon who makes and records a prognosis before each operation and checks up his pre-operative opinion with the result will rapidly gain in skill in this important department.

Miller classifies his cases into good, fair, and poor risks. Good risks: patients free from organic disease, whose surgical condition is not likely to prove fatal, are expected to recover. If a fatality occurs in this class of patients, the case should be carefully gone over to determine if the pre-operative prognosis was in error or the work of the surgical team to blame for the fatality. In fair risks, patients suffering from organic disease, but whose surgical condition is not especially serious, if no examination and no prognosis has been made, the necessity for a lame explanation of a fatality, for instance, fatal diabetic coma after appendectomy, is most

deplorable. In poor risks, patients whose surgical condition is so serious or so far advanced as likely to result in fatality, recovery may be unlikely without operation, and the prospect of death should be anticipated by due warning.

In a series of 1000 consecutive operations, studied under this classification, Miller found the following results:

	Class 1.	Class 2.	Class 3.	Total.
Cases .....	734	179	87	1000
Deaths .....	2	14	29	45
Percentage ..	.27	7.82	33.33	4.5

The deaths recorded occurred in from twenty-four hours to three weeks after operation. No deaths took place during or immediately following operation. Measured measures of anesthesia were used by Miller exclusively.

To determine the accuracy of Moot's rule: that if the pressure ratio, representing the relationship existing between the kinetic energy expended by the cardiac contraction in moving the blood column and the potential energy stored in the arterial walls and columns of blood which they contain, lies between 25 and 75 per cent., the case is probably operable, if outside these limits, probably inoperable. Miller investigated his series of 1000 cases and tabulated the results. According to Moots' rule 3.23 per cent. of the operable cases died and 96.77 per cent. recovered. Of the inoperable cases 23.07 per cent. died and 76.93 per cent. recovered. Some of the cases classed as inoperable underwent minor operations safely, and some of those classed as operable died after very serious operations and under circumstances which could not have been readily predicted. On an average, Miller believes that his results show the great value of Moots' rule in surgical prognosis.

McKesson's rule,—that after a half-hour of

sustained low blood pressure and rapid pulse almost every patient succumbs either shortly or within three days of surgical shock and heart exhaustion,—was put to a similar test. In a considerable number of cases shock, characterized by a diastolic pressure of 80 mm. or less, a pulse pressure of 20 mm. or less, and a pulse rate of 120 or more, was reported by Miller to his surgeons and the operation rapidly completed. All of these patients recovered. Thirteen of the patients were in the danger zone from twenty-five to seventy minutes. Of these nine died, giving a mortality rate of 69.23 per cent. These figures certainly indicate the great value of McKesson's rule for determining shock during operation.

Both rules, according to Miller's conclusions, are trustworthy and valuable aids and should be routinely employed.

[*Quarterly Journal of Medicine*, Oxford, Eng., July 1919, Vol. xii, No. 48, pp. 404-8.]

#### **Patches of Deep Pigmentation of the Oral Mucous Membrane Not Connected with Addison's Disease.** BY F. PARKES WEBER.

The case upon which this report is based consists of a man, fifty-seven years old, a Hungarian Hebrew tailor, suffering from advanced and acute pulmonary tuberculosis and tuberculous spinal caries. He had remarkable, deep (blackish) pigmentation of the buccal mucosa and pigmentation to a less extent of the mucosa of the palate and lips. There was likewise considerable pigmentation of the skin of the face and he was of dark complexion. No typical pigmentation of Addison's disease appeared elsewhere on his body. At necropsy there was no evidence of disease detected by macroscopic or microscopic examination in the pancreas, pituitary body, pineal body, or either suprarenal gland. Weber is unable to suggest the cause for the oral pigmentation in this case. He quite extensively reviews the literature of the subject, which is summarized as follows:

(1) There is a certain group of cases in which pigmentation, not connected with Addison's disease, occurs on the oral mucosa. The pigmentation is in the form of blackish spots and patches in the mucosa of the lips or cheeks and sometimes of other parts of the mouth. It is associated with pigmentation of the skin of the face, especially about the

mouth and possibly (in one or two cases) of other parts of the body.

(2) It occurs in persons of dark complexion, perhaps especially in Roumanian Jews and in certain races such as Lascars.

(3) It is of unknown causation and seems in some cases to be of a "physiological" or perhaps of atavistic origin. It may be analogous to the black patches often present in the oral mucosa of dogs and other animals. It appears to be allied to simple pigment-nevi of the skin on the one hand and to freckles (ephelides, lentigines) on the other.

(4) Jonathan Hutchinson was probably the first to call attention to this class of pigmentation, which perhaps should include various cases published by French authors under the headings "physiological pigmentation" and "racial (ethnic) pigmentation."

(5) Although it has been found in syphilities (Milian, 1913, *Bulletin et mem. Soc. Med. d'Hôp. de Paris*, xxxvi. 297), there is no reason to believe the association more than a coincidence.

(6) It is possible that a similar kind of pigmentation may be in some indirect way (e.g., from local hemorrhages and local inflammatory conditions associated with foul teeth and pyorrhea alveolaris) causally connected with pernicious anemia.

[*Texas State Journal of Medicine*, Fort Worth, October 1919.]

#### **Reflex Disturbances Originating in Nose, Throat, and Mouth.** BY S. J. CLARK.

Four of the nine cases, given in brief, involve some dental or oral lesion.

CASE I. Miss S., age thirty-five; had always enjoyed good health until six months ago, when she developed articular rheumatism. Marked pyorrhea alveolaris and evidences of tonsil infection; treatment of the gingival trouble brought prompt results. The rheumatism was much relieved, and two weeks after tonsillectomy the trouble had cleared up entirely.

Why Clark views this as a case of reflex disturbance instead of a clear-cut one of focal infection is not at all apparent.

CASE II. Miss M., age twenty, general health fairly good. For the past seven months has been suffering with pain at intervals in her left ear and temporo-mandibular articulation. No trouble found in ear. An im-



packed third molar was found, accounting for the pain.

CASE III. Mrs. G., presented in state bordering on nervous collapse. Severe pain in left ear of five weeks' duration. Ear treated without avail. Extraction of left mandibular third molar brought immediate relief.

CASE IV. Mr. W., age forty-five; general health good; pain back of left ear at intervals. Removal of roots of a maxillary molar was followed by cessation of pain in mastoid region.

[*Wiener Vierteljahrsschrift für Zahnheilkunde*, July 1919.]

#### **Follicular Cyst Arising From a Rudimentary Fourth Molar.** BY HARRY SICHER.

The patient, a girl of eighteen years, was entirely unaware of the swelling on the left side of her palate. The maxillary dental arch was complete except for the third molars, which were not yet erupted. The swelling was along the side of the left first and second molars, from the foot of the alveolar process almost to the midline, extending distal to the boundary between the soft and hard palate. The tumor was grooved superficially by a sagittal furrow. The lateral portion by its darker color indicated a marked thinning of the mucosa; fluctuation was noticeable, especially in this part. Roentgenogram showed practically normal conditions. Under conduction anesthesia the cyst was opened and the third molar removed. The crown of the tooth was atypical, possessing an accessory disto-lingual cusp, which was the only part of the tooth which extended into the cyst cavity.

Bolk (*DENTAL COSMOS*) has shown all gradations from such an accessory cusp to a complete, independent tooth. In other words, such a disto-lingual cusp is homologous to and representative of an accessory tooth, the so-called fourth molar. Whatever be the justice of Bolk's views, it is certain that overactivity of the ectodermal tooth-band or enamel-organ may manifest itself as an accessory tooth, an accessory cusp or root, as a cyst, or as by the synchronous appearance of a combination of these anomalies. Another instance of the association of an atypically formed tooth (a four-rooted mandibular third molar) with a dentigerous cyst is reported by Cooper (*vd. DENTAL COSMOS*, 1919, p. 788).

[*Proceedings of the Royal Society of Medicine, Section on Laryngology*, August 1919, xii, pp. 9, 212.]

#### **Case of Chronic Osteomyelitis of Maxilla.** BY G. W. DAWSON.

Woman of thirty years; alveolar abscess on right maxillary first incisor which had opened into nose. Also a sinus passing through right nasal process of maxilla to right middle meatus. The maxillary antrum had been opened and part of inferior turbinate removed. Wassermann, negative. Sections of granulation tissue from the nose showed chronic inflammatory changes but no evidence of tuberculosis.

A Caldwell-Luc operation was performed on right antrum; the alveolar abscess was curetted and a small sequestrum removed. A chronic abscess in connection with right maxillary canine also curetted. Later a large sequestrum of the right alveolus separated and was removed. There is now a large opening into the right antrum in the canine fossa, and the condition of the interior of the nose resembles lupus, particularly the granulation tissue on the anterior part of the septum. The patient has not at any time had a temperature and has not appeared to be ill.

[*Laryngoscope*, St. Louis, August 1919.]

#### **"Idiopathic" Epilepsy Found to be Due to Empyema of Antrum of Highmore. Operation and Recovery.** BY J. C. KEELER.

CASE. Male, age thirty-four years. During the past five years he suffered frequent convulsions, increasing in frequency and severity. His condition was diagnosed as "idiopathic epilepsy." Audition impaired (had only about one-third normal power in left ear). Gait was staggering; attacks of dizziness so great that he would fall. Immediately preceding a convulsion he experienced a queer feeling in his head (aura), and after convulsion he observed a thick, light-colored, offensive discharge from the nose, which seemed to relieve the head symptoms. Examination (inspection, transillumination, and roentgen ray) revealed an empyema of left maxillary sinus. Drainage by a trocar brought temporary relief. Hearing and general health improved greatly. Under ether the so-called Caldwell-Luc operation was per-



formed. Recovery complete and rapid. In five weeks he was able to resume active military duties.

Keeler looks upon the condition, not as a case of idiopathic epilepsy, but as one due to focal infection.

[**Abd. El-Farag Ali, 1919. An Elephant with Four Tusks.** *Sudan Notes and Records*, Vol. ii, No. 3, Jl. p. 231.]

(This reference with illustrations is given by JOHN M. CLARKE, in *Science*, Oct. 24, 1919, p. 395.)

The note contains no other information than that given in the title except that "The left tusk was the bigger and had the usual direction, but the direction of the small tusk was downward and came out from under the big one. It was round, and its thickness was about  $2\frac{1}{2}$  inches. The direction of the right tusk was downward and the small tusk came out from under it in the usual direction, but it was small like the other one."

On account of the unusual nature of this report, an attempt was made to find similar references: however, in vain.

E. Magitot (1877) in his "Traite des anomalies du systeme dentaire chez l'homme et les mammiferes," makes no reference to the proboscidea.

In Chapters IX and X in which Bateson ("Materials for Study of Variation," 1894) discusses the variations in the dental equipments, the elephants are not considered. Paul de Terra (1911) in his "Vergleichende Anatomie des menschlichen Gebisses und der Zaehne der Vertebraten," on p. 335, definitely states that the modern elephant never possesses tusks in the mandible.

There is some reason for regarding as an atavism the occurrence of mandibular tusks in the elephant. H. F. Osborn in his "Age of Mammals," on p. 330, states that in the evolution of the proboscidea, one of the most important of the changes in the skull, tusks, and grinders is the "loss of the lower tusks." In the Middle Miocene, *Trilophodon angustidens* was equipped with four straight and forwardly projecting tusks (p. 254). In another proboscidean group, the *Dinotheres* (becoming extinct in the Lower Pliocene), the upper tusks are absent but in the lower jaw is a pair of tusks projecting downward.

Lull (1908), in his summary of the evo-

lution of the elephant (*American Journal of Science*, xxv, March), gives illustrations of the normal occurrence of mandibular tusks in the proboscidean ancestors (*Moeritherium*, Fig. 12, p. 187, and *Palæomastodon*, Fig. 14, p. 188).

[*Journal of the American Medical Association*, December 27, 1919.]

**Actinomycosis Treated with Radium.** BY S. A. HEYERDAHL.

The author reports six cases, which are summarized below. The interest lies in the fact that the parts affected and the history of the cases point to a dental or at least an oral source of primary infection. The remarkable success in the treatment with radium is noteworthy.

CASE 1. A man of thirty-two years, with actinomycosis of right cheek.

*First treatment.* The whole of the swollen cheek was subjected for three days (twenty-four hours in each place) to 4 cg. of radium (tube preparation).

*Second treatment.* About three weeks later, three days' treatment with about one-half as strong doses as at the first treatment. The patient has been well since.

CASE 2. A boy of seventeen years, with actinomycosis of left cheek and neck under left ear. In the mouth in the mucosa above left canine was a projecting swelling, the size of a bean with a center of pus.

*First treatment.* 21 cg. radium (tube preparation) with lead filter, 1 mm. thick, were applied to the outside of the tumor, and a surface preparation of 2 by 1 cm. (0.5 mm. lead filter) was applied in the mouth for five hours.

*Second treatment.* About three weeks later, with half doses. No relapse up to at least one year.

CASE 3. A man of forty-four years. Neck affected; began as a small lump under skin over right mandible four months before presenting.

*First treatment.* In all 20 cg. radium (tube preparation) with a strong lead filter (1 mm.) for twenty-four hours.

*Second treatment.* About five weeks later, with about one-half dose.

*Third treatment.* About seven weeks later, 4 cg. for twenty-four hours.

CASE 4. A man of seventy-nine years; neck affected; serious.

*First treatment.* 10 cg. radium (tube preparation) with lead filter (1 mm.) for twenty-four hours; also surface preparations.

*Second treatment.* About six weeks after first treatment, with about the same doses.

*Third treatment.* Surface preparation. Cured; no return.

CASE 5. A man of eighteen years; face and neck affected.

*First treatment.* In all 20 cg. radium (tube preparation) for twenty-four hours.

*Second treatment.* About six weeks later, 20 cg. radium for twenty-four hours.

*Third treatment.* About five weeks later, 14 cg. radium for twenty-four hours.

CASE 6. A man of twenty-seven years; neck affected.

*First treatment.* 20 cg. radium (tube preparation) with lead filter (2 mm.) applied on outside of neck for twenty-four hours, and in mouth 2 cg. radium with lead filter (1 mm.) for twenty-four hours.

*Second treatment.* About six weeks later, with application of same doses. Permanently cured.

[*Journal of Laryngology, Rhinology, and Otology*, vol. v, November 1919, London.]

**Case of Infection of Lacrimal Sacs, Maxillary Antrum, Pharynx, Tonsils, Mouth, and Parotid Glands, Caused by *Blastomyces Albicans* (Thrush Organism).** By W. BARRIE BROWNLIE.

The case was that of a man, age forty-one years. Apparently the infection started around the eyes and only after three weeks began to descend. On examination of the mouth the most important feature was the dry appearance of the buccal, lingual, and pharyngeal mucosæ, which were dotted over with points of yellowish-white sticky mucus. The orifice of Stenson's duct on both sides, especially the right (right parotid slightly more swollen), had a definitely pointing appearance as compared with normal, and around orifices and also adhering to adjacent

alveolar margin were colonies of yellowish-white mucus larger than those found in the nose and pharynx. The vault of the pharynx was quite clear. Patient had no cough. No enlargement of sublingual and submaxillary glands; no colonies found under tongue. A few septic maxillary premolars and molars present. Wassermann, negative.

Smears from the mucus on staining showed tetracocci (presumably *M. tetragenus*), fair numbers of staphylococci, no streptococci, rods morphologically resembling bacteria of the colon and proteus groups, and a few small groups of large oval cells of the genus *Blastomyces*. Solated fragments of a mycelium occur here and there. This yeast was isolated from the mucus.

Microscopic examination of pieces of antral mucosa showed many pseudo-tubercular lesions, suggesting giant-cell systems. Such sections when appropriately stained showed neither blastomyces nor bacteria (no acid-fast organisms found). A von Pirquet test was negative both for human and bovine tuberculin. The pseudo-tubercles contain no foreign material; possibly they arise in the glands from active epithelial proliferation.

*Treatment.* A double radical antrum operation (Caldwell-Luc) with removal of anterior ends of inferior turbinates under chloroform. Usual postoperative treatment of a radical antrum operation. In addition, after each washing-out, a little sugar solution (5 per cent.) with some yeast suspended in it was introduced. A mouthwash and gargle of chlorin water was used by the patient frequently daily. Between times the sucking of a peppermint drop was advised to encourage salivation. The throat was painted thrice daily with Mandl's paint (KI) starting at 10 gr. thrice daily, and increasing up to 30 gr. thrice daily.

The nose condition seemed to be relieved considerably immediately after operation, but the dry mouth and throat with parotid enlargement continued for many months, only gradually returning to normal by lapse of time rather than yielding to any special treatment.



# OBITUARY

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## Dr. James McManus.

[SEE FRONTISPIECE.]

DIED. at his home, in Hartford, Conn., February 9, 1920, in his eighty-fourth year, of infirmities incident to his advanced age, JAMES McMANUS, D.D.S.

Dr. McManus was born in Hartford, July 16, 1836, the son of James McManus and Ellen (Goodwin) McManus, both of County Fermanagh, Ireland, who came to America and settled in Hartford in 1830. As a boy Dr. McManus attended the Hartford Common School until twelve years of age, when he left to answer an advertisement by Dr. Hiram Preston for an "office boy" by whom he was employed in that capacity, becoming in due course of time laboratory assistant, student, office assistant, partner, and finally, upon the retirement of Dr. Preston, succeeded him in his practice.

The foregoing brief record fairly represents the preparatory phase of the training of that pioneer group of dental practitioners who laid the foundations for and helped so successfully to create the standards of American dentistry. As a group they were self-educated men, educated in the hard school of practical experience, they were thinking men who had learned to solve their own problems as they arose in practice, and those of larger mind and keener sensibilities developed in that same school of experience even in the midst of adverse surroundings a breadth of ethical sentiment, a sympathetic understanding of the struggling young practitioner's problems that was expressed in the fine spirit of helpfulness and generosity so characteristic of the subject of this sketch. If one were asked to specify the dominant factor in the life of Dr. James McManus, the quality that characterized his attitude toward those with whom he came into contact, it would doubtless be the commonly accepted opinion that it was his human sympathy, his generous spirit of helpfulness. These qualities constantly radiated from him and were the crowning attributes of his character.

It is thus easy to understand his vital interest in all that affected the interests of his profession and the motive which animated all of his professional activities. He was the champion of every cause that would serve the advancement of dentistry as a profession. Entering upon professional practice at a period when the tendency to exclusiveness and secrecy among practitioners was still an inheritance of the earlier formative period of the profession, he practically recognized the fact that the way of salvation for dentistry lay in the direction of co-operation and free interchange of ideas, in harmony with which belief he issued the call for the first meeting for organization of the Connecticut State Dental Association, of which he was the first secretary, was thereafter twice elected to its presidency, and presided at its Fiftieth Anniversary meeting.

Dr. McManus was deeply interested in dental historical matters and more particularly in emphasizing the honor due to those distinguished members of the profession who had by their accomplishments earned the gratitude of their colleagues. Among his notable activities in this connection were his successful advocacy of the erection of monuments to his townsmen, Horace Wells, the discoverer of nitrous oxid anesthesia, and Horace Hayden, who with Chapin A. Harris founded the Baltimore College of Dental Surgery in 1839, the mother of all dental colleges. He did much effective work in a quiet, unobtrusive way to secure a competent dental service in the Army and Navy. He was appointed the first Dental Commissioner of the State of Connecticut, but declined to serve.

Dr. McManus contributed largely to dental literature, his most important writings pertaining to dental history, among which should be especially noted his "Horace Wells, Discoverer of Anesthesia," and "Early History of Dentists in Connecticut," these in addition to many contributions on historical and professional subjects. He was a member of the Northeastern Dental Association and its first president, the National Dental Association, of



which he was twice vice-president, the American Academy of Dental Science, the Horace Wells Club, the American Dental Society of Europe, besides the Hartford Club, the Connecticut Historical Society, and an honorary member of the Hartford Medical Society. The degree D.D.S. was conferred upon him in 1865 by the Philadelphia Dental College.

Dr. McManus was twice married, to Eliza M. Fagan of New Haven, Conn., 1861, and to Ella Burr, of Hartford, Conn., 1874. His two sons, Charles and Henry McManus, who practiced with him, also a brother and sister, survive him.

His remains were interred at Hartford, February 12, 1920.

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### "In Memoriam."

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#### Dr. James McManus.

THE following is a tribute to the memory of Dr. James McManus by the Hartford Dental Society:

With deepest regret we record the death of our professional brother, our staunch and true friend, Dr. James McManus.

He was known the world over as one deeply

interested in the progress and elevation of the dental profession and was prominent in establishing the fact that Horace Wells was the discoverer of anesthesia. He took an active part in our National Society and was held in the highest esteem. We believe the records of dental conventions held throughout the country for a period of many years would show the name of Dr. James McManus, as having taken an active part in all vital matters pertaining to the profession, more frequently than that of any other man in the country. He was an organizer of the Connecticut State Dental Society and at one time its president, and his interest in the society never abated. He was a charter member of the Hartford Dental Society, has given it his valuable counsel and conscientious support during all the years of its existence, and was rarely ever absent from its meetings as long as he was able to attend.

His memory will always be cherished by his many friends and he will be remembered by the Hartford Dental Society as one of its greatest benefactors.

He will be greatly missed.

GILBERT M. GRISWOLD,

NELSON J. GOODWIN,

CHARLES H. RIGGS,

*Committee.*

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## DENTAL COLLEGE COMMENCEMENTS

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### New York College of Dentistry.

SPECIAL commencement exercises were held by the New York College of Dentistry in the lecture hall of the college on Thursday, January 22, 1920.

An address was delivered by Prof. A. R. Starr, M.D., D.D.S., Dean.

The degree of Doctor of Dental Surgery was conferred on the following graduates:

Leon R. Cahen  
Harry G. Chodroff  
Harry L. Cooper  
Harold F. Eagleton

Samuel Fuchs  
Paul E. Goidschlag  
Hyman H. Gottlieb  
Peter Greenblat

William G. Hogan  
Samuel J. Lieblich  
Jerome F. Martin  
Milton L. Reif

Isidor Sherman  
William I. Singer  
Harry Snitow  
Nathan J. Wolkowitz

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# ARMY AND NAVY DENTAL NEWS

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## Federal Aid to Soldiers.

IN almost every community in the United States there is a discharged soldier, sailor, marine, or war nurse, suffering from some injury, or ailment, which dates back to service with the fighting forces.

Often this injury or ailment has made it hard or impossible for them to fit in where they did formerly. They are handicapped and need help; not charity, but mental and physical reconstruction. In many cases such people unfortunately keep their troubles to themselves. They are reluctant to seek aid or advice, for fear their friends might consider them weak. Possibly you know such a person.

If you do, encourage him to take his troubles to the Government. The War Risk Insurance Bureau and the United States Public Health Service are especially anxious to get in touch with such individuals. The Public Health Service has set up a chain of reconstruction bases throughout the country for beneficiaries of the War Risk Bureau. These are not Army hospitals, nor is there Army discipline in connection with them, but rather a system of hospitals similar to the general hospital in large cities except that the treatment is free and goes much further than in the ordinary hospital.

Recreation, vocational training, and wholesome entertainment are combined with treatment. While men are being bodily rebuilt they have the opportunity of learning some useful occupation, or pursuing academic studies. They are taught not only to find themselves, but to better their condition. The environment is as homelike as it is possible to make it.

A great many men who went into the Army have developed tuberculosis and other diseases requiring special treatment. The Public Health Service has separate hospitals and sanatoriums for these patients, where they may get the best treatment known to medical science.

A large number of soldiers are not yet aware that the Government offers them free treatment. Please tell them.

[The free medical service to discharged soldiers includes dentistry in all its phases.—Ed.]

## Dental Corps Commissions.

THE Navy Department is in favor of legislation to give officers in the Dental Corps rank and pay from the date stated in their commissions. The Act, approved July 1, 1918, provides, among other things, that all officers now in the Dental Corps of the Navy, or who may hereafter be appointed, shall take rank and precedence with officers of the Naval Medical Corps of the same rank according to the dates of their respective commissions or original appointments, and shall receive the same pay and allowances as officers of corresponding rank and length of service in said Medical Corps, up to and including the rank of Lieutenant-Commander. The Comptroller of the Treasury, in construing the language of this act, held that an officer of the Dental Corps who is advanced in rank as authorized by said act is not entitled to the increased pay and allowances therein provided for prior to the date of the approval of said act. This decision, while probably warranted by the language of the act, is contrary to the principles established by the Act of March 4, 1913, for the purpose of correcting several conflicting decisions of the Comptroller of the Treasury extending over a period of more than fourteen years on the point of the date from which an officer of the naval service shall receive the pay and allowance of a rank or grade to which he has been promoted. It is proposed to place officers of the Dental Corps, promoted in accordance with the provisions of the Act of July 1, 1918, to take rank from a date stated in their commissions prior to the date of said act, in the same status relative to rank, pay, and allowances as that provided by the Act of March 4, 1913, for officers of the line and other staff corps, and to avoid further discrimination against them in matters of pay by virtue of the decision of the Comptroller.—*Army and Navy Register*.

## Assignments.

### Army Dental Corps.

*Week ending January 3d.*

Lieut.-Col. George I. Gunkel (promoted subject to examination), having been examined for promotion by a board of officers, and

found physically disqualified for the duties of a lieutenant-colonel in dental corps, by reason of disability incident to the service, his retirement from active service as a lieutenant-colonel is announced; proceed home.

The following to San Francisco and to Vladivostok, Siberia, January 5, for duty: Lieut.-Col. John R. Ames; Capts. Claude R. Hollister, Edward C. Alley; 1st-Lieuts. George M. Krough and Chester B. Parkinson.

Maj. Frederick R. Wunderlich from duty with American expeditionary forces, Vladivostok, Siberia, to United States and report for instructions.

Capt. Daniel Bratton, Oscar W. Thompson, to Camp Zachary Taylor, Ky., for duty.

1st-Lieut. Henry A. Winslow to general hospital 2, Fort McHenry, Md., for duty.

*Week ending January 17th.*

The resignation of Maj. E. Henry Valentine is accepted.

Maj. Dayid Archibald Proctor and 1st-Lieuts. George Robson White and William Alfonso Baker are honorably discharged.

Capt. Arthur Clay Foard to Walter Reed General Hospital, Washington, for duty.

1st-Lieut. Henry Lake Gilmour, Jr., to Camp A. A. Humphreys, Va., for duty.

Appointment of Clark Wayne Russell as 1st-lieutenant, Regular Army, from Oct. 28, 1919, is announced; to Fort Logan, Colo., for duty.

Appointment of Joseph Aloysius Murray as 1st-lieutenant, Regular Army, from Oct. 30, 1919, is announced; to Camp Dix, N. J., for duty.

Appointment of Forest Vernon Bockey as 1st-lieutenant, Regular Army, from Oct. 30, 1919, is announced; to report to commanding general, American Forces in Siberia, for duty.

Appointment of James Lawrence Olsen as 1st-lieutenant, Regular Army, from Oct. 31, 1919, is announced; to Camp Meade, Md., for duty.

Appointment of Alexander MacKenzie Telfer as 1st-lieutenant, Regular Army, with rank from Nov. 1, 1919, is announced; to Walter Reed General Hospital, Washington, for duty.

Appointment of Clyde Wakefield Scogin as 1st-lieutenant, Regular Army, from Nov. 3, 1919, is announced; to Alcatraz, Calif., disciplinary barracks, for duty.

The following temporary officers of the dental corps have been appointed 1st-lieutenants, Dental Corps, Regular Army: Capt. Page Purnell Albert Chessser, Oct. 25, 1919; 1st-Lieut. Ralph Eugene Morgan, Oct. 26, 1919; 1st-Lieut. Joseph Hayden Jones, Oct. 29, 1919; 1st-Lieut. Glenn Dale Lacey, Oct.

31, 1919; 1st-Lieut. Harold Snell Whitney, Nov. 1, 1919; 1st-Lieut. Egbert Wesley van Delden Cowan, Nov. 2, 1919; Capt. Beverley Morrison Epes, Nov. 4, 1919; Capt. Warren Charles Caldwell, Nov. 4, 1919.

*Week ending January 24th.*

Maj. Oscar P. Snyder to Camp Grant, Ill., for duty.

Maj. Rex McK. McDowell to Washington, and report to director of purchase and storage for duty.

Maj. Nathaniel Barnard to Jefferson Barracks, Mo., for duty.

The resignation by Homer L. Sams, dental corps, as temporary captain and as 1st-lieutenant (regular army) accepted.

1st-Lieut. Clyde W. Scogin to Denver, Colo., general hospital 21, for duty.

1st-Lieut. Robert C. Craven to Camp Grant, Ill., for duty.

1st-Lieut. Earl G. Gebhardt to Camp Grant, Ill., for duty.

*Week ending January 31st.*

Resignation by Maj. Ben H. Sherrard accepted.

Capt. Thomas M. Page to Camp Jackson, S. C., for duty.

1st-Lieut. Clyde W. Scogin to Fort McDowell, Calif., for duty.

1st-Lieut. Frank R. Gould, honorably discharged.

*Week ending February 7th.*

Maj. Frank W. Boville, honorably discharged.

Resignation by John L. Davis as temporary captain and as 1st-lieutenant (regular army) accepted.

1st-Lieut. Oscar R. Reed to San Antonio, Tex., air service flying school, Kelly Field, for duty.

1st-Lieut. Melville A. Sanderson, to Fort Warren, Mass., for duty.

1st-Lieut. James A. Curtis, Jr., to Camp Gordon, Ga., for duty.

*Week ending February 14th.*

Lieut.-Col. Harold O. Scott to Fort Leavenworth, Kans., for duty.

Capt. Elmer J. Nieder to Fox Hills, N. Y., general hospital 41, for duty.

Capt. Hooker O. Lindsey to East Potomac Park, D. C., for duty.

Resignations by Capts. Henry H. Collins, Orville A. Grove, accepted.

1st-Lieut. William F. Scheumann to West Point, N. Y., Military Academy, for duty.

1st-Lieuts. Grady P. Russell, Frank D. Voigt, honorably discharged.



*Week ending February 21st.*

Maj. Raymond W. Pearson to Fort Monroe, Va., for duty.

Capt. Waldo J. Adams to Camp Normoyle, Tex., for duty.

Capt. Hooker O. Lindsey to East Potomac Park, D. C., for duty.

Capt. Alexander M. Smith, Jr., to San Antonio, Tex., zone supply office, general supply depot, for duty.

Capt. Neil J. McCollum to Dayton, Ohio, McCook Field, for duty.

The resignation by Leslie A. Gould as temporary captain and as 1st-lieutenant (Regular Army) is accepted.

1st-Lieut. Lemuel P. Woolston to Fort Bliss, Tex., base hospital, for duty.

The resignation by 1st-Lieut. Richard C. Hoblitzell is accepted.

1st-Lieut. Wallace B. Bruce, honorably discharged.

*Week ending February 28th.*

Lieut.-Col. John A. McAlister, Jr., to Fort Sheridan, Ill., general hospital 28, for duty.

Maj. Leonard G. Mitchell and 1st-Lieut. Earl W. Guthridge, honorably discharged.

Capt. Everett H. Ruggles to Camp Dix, N. J., for duty.

Capt. Eugene A. Smith to Washington and report to attending surgeon for duty.

Resignations by Capts. Clarence R. Jacobson and Richard K. Thompson accepted.

1st-Lieut. Carl E. Safford to New York and to Panama about March 5th, for duty.

1st-Lieut. Jay R. Haskin to Camp Grant, Ill., for duty.

1st-Lieut. John A. Belfils to Camp Alfred Vail, N. J., for duty.

*Week ending March 13th.*

The following honorably discharged as Lieutenant-Colonels only: Lieut.-Cols. William S. Rice, Lester C. Ogg.

Maj. James L. Miller report to Camp Pike, Ark., for duty.

Maj. J. Craig King report to retiring board, Washington, for examination.

1st-Lieut. Roy L. Denson to Camp Benning, Ga., for duty.

1st-Lieut. William L. Herbert, honorably discharged.

**Navy Dental Corps.***Week ending January 7th.*

Lieut. Louis B. Lippman, detached from receiving ship at New York; to naval hospital, New York.

*Week ending January 31st.*

Lieut. Dean L. Chamberlain detached from navy yard, Puget Sound, Wash.; to duty at naval hospital, Puget Sound, Wash.

*Week ending February 7th.*

Lieut. Harold A. Daniels, detached from receiving ship at New York; to U. S. S. Bridgeport.

*Week ending February 21st.*

Lieut. Andrew L. Burleigh, detached from naval training station, Great Lakes, Ill.; to Minneapolis.

Lieut. Daniel A. Doherty, detached from naval training station, Newport, R. I.; to duty on receiving ship at Boston, Mass.

*Week ending February 28th.*

Lieut. Alvan B. Ward, detached from naval hospital, Fort Lyon, Colo.; to U. S. S. Birmingham for duty with reserve squadron.

Lieut. Ronnie A. Berry, detached from navy yard, Portsmouth, N. H.; to naval training station, Newport, R. I.

Lieut. Howard R. McCleary, detached from 15 separate battalion of marines, Quantico, Va.; to duty with marine expeditionary force, Haiti.

## *SPECIAL NOTICES.*

### **Dentists Wanted in the Navy Dental Corps.**

EXAMINATIONS for commissions in the Dental Corps of the United States Navy will be held at intervals.

A candidate for appointment must be between 21 and 32 years of age at the date of appointment, a graduate of a standard medical or dental college, of good moral character, and unquestionable professional repute.

Candidates if successful are commissioned as Assistant Dental Surgeons, with the rank of Lieutenant (junior grade). Officers of the Dental Corps are eligible for advancement in rank and increase of pay. The pay with allowances ranges from that on entrance of approximately \$2600 ashore and \$2200 at sea, to that of the highest pay obtainable after service and promotion of approximately \$6800 ashore and \$6100 at sea.

For further information address the Surgeon-General, United States Navy, Navy Department, Washington, D. C.

### **National Anesthesia Research Society.**

Announcement is made of the launching of the National Anesthesia Research Society, with the following officers: President, Stephen B. Morris, Philadelphia, Pa.; Secretary-Treasurer, B. J. Clark, Minneapolis, Minn.; Executive Secretary, T. T. Frankenburg, 16 E. Broad St., Columbus, Ohio, with the avowed purpose of collecting data and prosecuting original research in this field of medicine. The objects of the Society as set forth in the constitution are:

To promote the science of anesthesia and to enable its members, after first having obtained the approval of the Society, to submit without prejudice to the dental and medical professions any views, findings, or accomplishments they have attained; to obtain from all available sources such information as is now extant concerning any material, liquid or gas, known to have anesthetic properties; to arrange, in co-operation with dental, medical, and anesthesia associations for the preparation and delivery of suitable, interesting, and educational papers on the general subject, or relative to some particular anesthetic; to use influence to prevent the publication or circulation of any false or unauthentic statements concerning any and all conditions,

symptoms, or phenomena prevailing during or after anesthesia by any anesthetic, and to prepare and distribute on request, forms on which such information can be tabulated with uniformity; to distribute by pamphlet or publication, as its funds may permit, and its governing powers authorize, such reliable data as it may collect or obtain through its members or others interested in the subject of anesthesia, for use by the medical and dental professions; to co-operate with state authorities and other bodies in the preparation of suitable legislation to safeguard those to whom anesthetics are administered as well as those called upon to administer them; to use its influence in every way and to give its aid toward the advancement of the science of anesthesia.

The Research Committee, which will have supervision of original work and the editing of material designed for the profession and professional press, is headed by F. H. McMechan, A.M., M.D., of Avon Lake, Ohio, editor of the Quarterly Supplement of the "American Year Book of Anesthesia and Analgesia." W. I. Jones, D.D.S., president of the Interstate Anesthetists' Association, will have an active part in the committee's work. Representative anesthetists of the

country, who have distinguished themselves by research and progress in their field, are being invited to join the committee.

The Society has been endowed with limited funds which will permit it to demonstrate that there is a field of usefulness for it.

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## SOCIETY NOTES AND ANNOUNCEMENTS

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### Coming Dental Society Meetings.

#### National Meetings.

AMERICAN SOCIETY OF ORTHODONTISTS.  
Chicago, Ill. April 5th to 7th.

CANADIAN DENTAL ASSOCIATION. Ottawa,  
Ont. August 17th to 20th.

NATIONAL DENTAL ASSOCIATION. Boston,  
Mass. August 23d to 27th.

#### State Meetings.

##### APRIL.

ALABAMA DENTAL ASSOCIATION. Mobile.  
April 13th to 15th.

CONNECTICUT STATE DENTAL ASSOCIATION.  
New London. April 20th to 22d.

DENTAL DEPARTMENT OF THE UNIVERSITY  
OF BUFFALO, ALUMNI ASSOCIATION. Buffalo.  
April 15th to 17th.

DEWEY SCHOOL OF ORTHODONTIA, ALUMNI  
SOCIETY. Chicago. April 1st to 3d.

KENTUCKY STATE DENTAL ASSOCIATION.  
Louisville. April 7th to 9th.

MICHIGAN STATE DENTAL SOCIETY. Detroit.  
April 12th to 14th.

MISSOURI STATE DENTAL ASSOCIATION.  
Kansas City. April 12th to 14th.

PENNSYLVANIA STATE DENTAL SOCIETY.  
Reading. April 27th to 29th.

PHILADELPHIA DENTAL COLLEGE, ALUMNI  
SOCIETY. Philadelphia. April 21st.

PSI OMEGA (NEW YORK ALUMNI CHAPTER).  
New York City. April 17th.

SOUTH DAKOTA STATE DENTAL SOCIETY.  
Sioux Falls. March 29th to April 3d.

##### MAY.

DENTAL SOCIETY OF THE STATE OF NEW  
York. Albany. May 13th to 15th.

INDIANA STATE DENTAL ASSOCIATION.  
Indianapolis. May 17th to 20th.

ONTARIO DENTAL SOCIETY. Toronto. May  
3d to 6th.

TENNESSEE STATE DENTAL ASSOCIATION.  
Chattanooga. May 27th to 29th.

##### JUNE.

FLORIDA STATE DENTAL SOCIETY. Miami.  
June 15th to 17th.

VIRGINIA STATE DENTAL ASSOCIATION. Old  
Point Comfort. June 30th to July 3d.

#### Examiners' Meetings.

CALIFORNIA BOARD OF EXAMINERS. San  
Francisco. June 21st.

IOWA BOARD OF EXAMINERS. Iowa City.  
June 7th.

MAINE BOARD OF EXAMINERS. Augusta.  
July 7th to 9th.

MARYLAND BOARD OF EXAMINERS. Balti-  
more. June 9th and 10th.

MISSISSIPPI BOARD OF EXAMINERS. Jack-  
son. June 15th.

NEBRASKA BOARD OF EXAMINERS. Omaha.  
June 8th and 9th. Lincoln, June 8th to 12th.

NORTH CAROLINA BOARD OF EXAMINERS.  
Wrightsville Beach. June 19th.

NEW HAMPSHIRE BOARD OF EXAMINERS.  
Manchester. June 30th, July 1st and 2d.

OKLAHOMA BOARD OF EXAMINERS. Okla-  
homa City. June 7th to 12th.

PENNSYLVANIA BOARD OF EXAMINERS.  
Philadelphia and Pittsburgh. June 23d to  
26th.

VERMONT BOARD OF EXAMINERS. Mont-  
pelier. June 28th to 30th.

VIRGINIA BOARD OF EXAMINERS. Richmond.  
June 8th.

WISCONSIN BOARD OF EXAMINERS. Mil-  
waukee. June 21st.



## American Society of Orthodontists.

THE next annual meeting of the American Society of Orthodontists will be held at the Edgewater Beach Hotel, Chicago, Ill., Monday, Tuesday, and Wednesday, April 5, 6, and 7, 1920. Those interested in orthodontia are invited to attend.

J. V. Mershon, *President*,  
Philadelphia, Pa.  
F. M. Casto, *Sec'y*,  
Cleveland, Ohio.

## National Dental Association.

THE twenty-fourth annual meeting of the National Dental Association will be held in Mechanics Building, Boston, Mass., August 23 to 27, 1920.

The Mechanics Building is one of the largest in the United States for exhibition purposes of every description. It is over six hundred feet in length and covers over three acres of land, containing over 150,000 square feet of floor space, and is known all over the continent as the home of the far-famed poultry, automobile, and dog shows, mechanics' and food fairs. World-renowned opera singers have entertained thousands of music lovers in the Grand Hall. Presidents and noted speakers have addressed thousands of citizens of Massachusetts in this vast hall.

The association is indeed fortunate to secure such a building for its meeting, as it assures ample room for clinics, demonstrations, and exhibits under one roof, with facilities for taking care of ten thousand members of the profession and guests.

F. E. Jeffrey, *Chmn. Pub. Committee*,  
Salem, Mass.

## Alabama Dental Association.

THE next regular meeting of the Alabama Dental Association meets at Mobile, Ala., April 13, 14, and 15, 1920.

S. B. Hopkins, *Sec'y*,  
Greenville, Ala.

## Missouri State Dental Association.

THE annual meeting of the Missouri State Dental Association will be held at the Baltimore Hotel, Kansas City, Mo., April 12, 13, and 14, 1920.

H. C. Pollock, *Sec'y*,  
Metropolitan Bldg., St. Louis.

## Philadelphia Dental College.

### ALUMNI SOCIETY.

THE annual meeting of the Alumni Society of the Philadelphia Dental College (Temple University) will be held on Wednesday, April 21, 1920, at 9 A.M., in the college building at Eighteenth and Buttonwood sts., Philadelphia. All members should note the date and arrange to be present. If you are not a member you are welcome to come and enjoy the P. D. C. brand of clinics and papers. We have secured as essayist, Dr. Harvey J. Burkhart, Director of the Rochester Dental Dispensary, and past-president of the National Dental Association. His subject is Oral Hygiene, a very important subject just at this time to all dentists.

Franklin S. Fluck, *Pub. Com.*,  
2440 N. Seventh st., Philadelphia, Pa.

## Dental Department of the University of Buffalo.

### ALUMNI ASSOCIATION.

THE Alumni Association of the Dental Department of the University of Buffalo will hold its annual meeting at the Hotel Iroquois, on April 15, 16, and 17, 1920.

The meeting will be a part of an alumni postgraduate week. The week of April 12th will afford an opportunity for every dentist who chooses to take postgraduate work from the following men:

Rupert E. Hall, D.D.S., Chicago, Ill. "Full Prosthesis."

W. Earnest Cummer, D.D.S., Toronto, Ont. "Attached Plates and Removable Bridge Work."

Clifford E. Rose, D.D.S., Buffalo, N. Y. "Conduction Anesthesia."

Leuman M. Waugh, D.D.S., New York City. "Radiology."

This elaborate offering for your approval is an entire departure from plans of other years, and will, if you choose to make it so, be the most beneficial thing the association has ever done for the dental profession.

The regular alumni meeting, which will occur the last three days of the week, will be addressed by the men who give the course, and, together with a large general clinic and an unusually attractive exhibit, will make a program which we are proud to present to you.

The postgraduate classes will be limited to

thirty men in each subject, and will be so arranged that any two subjects, excepting "Full Prosthesis," can be taken in the week. Further information regarding this feature of the meeting can be obtained from Dr. J. G. Roberts, 174 E. Ferry st., or Dr. W. W. Cavers, 450 Elmwood ave., Buffalo.

Your officers and committees are exerting every effort to give you a profitable week for study and pleasant association. We anxiously seek your approval.

JAMES L. CLEMENTS, *President*,

CLIFFORD E. ROSE, *Secretary*,

GUY M. FIERO, *Chmn. Business Com.*

### Kentucky State Dental Association.

THE next annual meeting of the Kentucky State Dental Association will be held in Louisville, Ky., April 7, 8, and 9, 1920.

A program of unusual interest has been planned. Address all correspondence to

W. M. RANDALL, *Sec'y*,

1035 Second st., Louisville, Ky.

### Michigan State Dental Society.

THE next annual meeting of the Michigan State Dental Society will be held at the Hotel Statler, Detroit, Mich., April 12, 13, and 14, 1920.

The chairman on local arrangements is William H. Waller, 613 Washington Arcade, Detroit, Mich., and the secretary, Claude S. Larned, 614 Post Building, Battle Creek, Mich.

CLAUDE S. LARNED, *Sec'y*,

Battle Creek, Mich.

### Psi Omega.

THE twenty-eighth annual banquet of the New York Alumni Chapter of the Psi Omega will be held in the Hotel Commodore, 42d st. and Lexington ave., Saturday evening, April 17, 1920, at 7 P.M.

All Psi Omegas are cordially and fraternally invited to join with us.

For further information inquire of

JOHN L. PETERS, *Treasurer*,

133 W. 72d st., New York City.

### Connecticut State Dental Association.

THE annual meeting and convention of the Connecticut State Dental Association will be

held in the Mohican Hotel, New London, Conn., on Tuesday, Wednesday, and Thursday, April 20, 21, and 22, 1920. One of the finest programs ever attempted will be presented, and in the quality of the papers and the number and variety of clinics and exhibits will surpass any meeting. A program as well as cards of admission may be obtained from the secretary.

MORTON J. LOEB, *Sec'y*,

241 Orange st., New Haven, Conn.

### Pennsylvania State Dental Society.

THE fifty-second annual meeting of the Pennsylvania State Dental Society will be held in the Rajah Theater, Reading, Pa., April 27, 28, and 29, 1920. An interesting and instructive program has been prepared. All ethical practitioners are invited to be present.

W. L. FICKES, *Sec'y*,

6004 Penn ave., Pittsburgh, Pa.

### Ontario Dental Society.

THE fifty-third annual meeting of the Ontario Dental Society will be held in Toronto, Ont., May 3, 4, 5, and 6, 1920.

J. A. BOTHWELL, *Sec'y*,

2 Bloor st., E., Toronto, Ont.

### Indiana State Dental Association.

THE sixty-second annual meeting of the Indiana State Dental Association will be held in the Claypool Hotel, in Indianapolis, Ind., May 17, 18, 19, and 20, 1920.

A. J. KIMM, *Sec'y*,

704-05 Citizens Bank Bldg., Evansville, Ind.

### Tennessee State Dental Association.

THE fifty-third annual meeting of the Tennessee State Dental Association will be held in Chattanooga, Tenn., May 27 to 29, 1920.

OLIVER J. O'NEAL,

*Ch'm'n Publicity Committee*,

Chattanooga, Tenn.

### Dental Society of the State of New York.

THE fifty-second annual meeting of the Dental Society of the State of New York will be held in Albany, May 13, 14, and 15, 1920, at the Hotel Ten Eyck. An interesting program of essays and clinics is being prepared and will be announced later. All ethical dentists residing in New York and adjoining

states are cordially invited to attend the meeting.

Dr. L. S. Blatner, 346 State st., Albany, N. Y., is chairman of the Exhibits Committee.

A. P. BURKHART, *Sec'y*,  
52 Genesee st., Auburn, N. Y.

### Florida State Dental Society.

THE annual meeting of the Florida State Dental Society will be held at Miami, Fla., on June 15, 16, and 17, 1920.

H. B. PATTISHALL, *Sec'y*,  
Jacksonville, Fla.

### Virginia State Dental Association.

THE fifty-first annual meeting of the Virginia State Dental Association will be held at Hotel Chamberlin, Old Point Comfort, Va., June 30 to July 3, 1920.

HARRY BEAR, *Sec'y*,  
410 Professional Bldg., Richmond, Va.

### National Anesthesia Research Society.

At a meeting of the Board of Governors of the National Anesthesia Research Society held in Cleveland in March, it was voted to have the annual convention of the society at Pittsburgh the week of October 4th, this meeting to be in conjunction with that of the Interstate Anesthetists Association and the Pennsylvania Medical Society. It is possible that the Western Pennsylvania Dental Association also will join in the meeting.

In order to augment interest in the primary purpose of the society, which is research, the governors voted \$200 to be apportioned in prizes for the best papers on research in anesthesia, such papers to be read at the national meeting. This offer is open to all students, surgical, medical, and dental practitioners in the United States.

Canvass of hospitals having revealed need for a uniform anesthesia chart, a committee of three was appointed to prepare forms. The committee consists of Dr. A. F. Erdman of Brooklyn, Dr. A. H. Miller of Providence, and Dr. E. I. McKesson of Toledo. It was also decided to prepare and publish at the earliest moment possible a monograph on the best practices in anesthesia in obstetrics.

Announcement was made of the acceptance of the following well-known physicians, dentists, and anesthetists as members of the

Research Committee: Dr. F. C. Mann, Rochester, N. Y.; Dr. John Evans, Buffalo, N. Y.; Dr. A. E. Guedell, Indianapolis, Ind.; Dr. Wm. Harper DeFord, Des Moines; Dr. W. E. Burge, Univ. of Illinois; Dr. Wm. Hamilton Long, Louisville, Ky.; Dr. J. Griffith Davis, Baltimore, Md.; Dr. J. J. Buettner, Syracuse, N. Y.; Dr. Tyler, Philadelphia; Dr. Isabella C. Herb, Chicago; Dr. A. F. Erdman, Brooklyn; Dr. A. H. Miller, Providence; Dr. W. B. Howell, Montreal, Canada; Dr. R. S. Hopkinson, Milwaukee; Dr. Oel E. Lamphear, Kalamazoo; Dr. W. I. Jones, Columbus; Dr. Theo. Casto, Philadelphia; Dr. S. P. Reimann, Philadelphia; Dr. John Polak, Brooklyn, N. Y.

T. T. FRANKENBURG, *Executive Sec'y*,  
16 E. Broad st., Columbus, Ohio.

### Dental Hygienists of California.

THE Dental Hygienists of California, an association of graduate dental hygienists, has just been formed.

The object of this new society is the furtherance of the oral hygiene campaign, and to broaden the education of the hygienist.

The officers are Mrs. A. O. Wright of Oakland, graduated from University of California, president; Miss Elma Platt of San Francisco, Forsyth graduate, vice-president; Miss Helen Prosser, San Francisco, graduate of University of California, treasurer; Miss Charlotte Greenwood, San Francisco, Forsyth graduate, secretary.

CHARLOTTE GREENHOOD, *Sec'y*,  
2300 Franklin st., San Francisco, Calif.

### Maryland Board of Examiners.

THE Maryland Board of Dental Examiners will meet for examination of candidates for certificates in Baltimore, at the Dental Department of the University of Maryland, on June 9 and 10, 1920, at 9 A.M.

For application blanks and further information, apply to

F. F. DREW, *Sec'y*,  
701 N. Howard st., Baltimore, Md.

### Virginia Board of Examiners.

THE next meeting of the Virginia State Board of Dental Examiners will be held in Richmond, at the Medical College of Virginia, beginning promptly at 9 o'clock, Tuesday, June 8, 1920. For further information and application blanks, address

J. LEWIS WALKER, *Sec'y*,  
505 Taylor Bldg., Norfolk, Va.



### Oklahoma Board of Examiners.

THE next meeting of the Oklahoma State Board of Dental Examiners will be held June 7 to 12, 1920, in the Capitol Building (Senate Chamber) Oklahoma City. Oklahoma applications must be in at least ten days before examinations. Reciprocity has been canceled with all States.

L. M. DOSS, *Sec'y*,  
Oklahoma City, Okla.

### Iowa Board of Examiners.

THE Iowa State Board of Dental Examiners will meet for the purpose of examining candidates for license to practice in Iowa, at Iowa City, College of Dentistry, beginning Monday, June 7, 1920, at 9 A.M.

For further information and application blanks, address

C. B. MILLER, *Sec'y*,  
726 Fleming Bldg., Des Moines, Iowa.

### Mississippi Board of Examiners.

THE next regular annual meeting of the Mississippi Board of Dental Examiners will be held in the Senate Chamber at Jackson, June 15, 1920, according to the State law. For further information address

B. J. MARSHALL, *Sec'y*,  
Marks, Miss.

### New Hampshire Board of Examiners.

THE New Hampshire State Dental Board will hold its next meeting for examinations on June 30, July 1 and 2, 1920.

HARRY L. WATSON, *Sec'y*,  
913 Elm st., Manchester, N. H.

### California Board of Examiners.

THE next meeting of the Board of Dental Examiners of California for the purpose of examining applicants for license to practice dentistry in that state will be held in the city of San Francisco, beginning on June 21, 1920, at 9.30 A.M. Each applicant shall file with the secretary of the Board fifteen days before that date the following credentials: (1) diploma or certificate of graduation from a reputable dental college approved by the Board; (2) a diploma from an accredited high school or a certificate signed by the State Superintendent of Public Instruction (or similar officer), to the effect that the applicant has had scholastic preparation equivalent in all respects to that demanded for graduation

from a high school giving a four-years' course of instruction. In lieu of high-school credentials, an applicant, who has been a licensed practitioner of dentistry of some other state of the United States for a period of at least five years, shall file such license or licenses which will be accepted; (3) a testimonial of moral character; (4) a recent unmounted photograph.

For further information, address

C. A. HERRICK, *Sec'y*,  
133 Geary st., San Francisco, Calif.

### North Carolina Board of Examiners.

THE next meeting of the North Carolina State Board of Dental Examiners will be held at Wrightsville Beach, Wilmington, N. C., beginning promptly at 9 o'clock on Saturday morning, June 19, 1920.

For further information and application blanks, address

F. L. HUNT, *Sec'y*,  
Asheville, N. C.

### Wisconsin Board of Examiners.

THE next examination of the Wisconsin State Board of Dental Examiners will be held in Milwaukee, Wis., beginning June 21, 1920.

All applications and credentials must be in the hands of the secretary at least ten days before the examination. Full information and application blanks may be received by addressing

WILLIAM KETTLER, *Sec'y*,  
801—3d st., Milwaukee, Wis.

### Nebraska Board of Examiners.

THE next examination of the Nebraska Board of Examiners will be held June 8 and 9, 1920, in Omaha, and in Lincoln, on June 8th, 9th, 10th, 11th, and 12th. The examination in practical work will be June 8th and 9th, at Creighton University, Dental Department, Omaha, and at the University of Nebraska, College of Dentistry, Lincoln. The written examination will be given June 10th, 11th, and 12th, at the State-house, Lincoln.

Applications should be on file with this department not later than May 24th.

H. H. ANTLES, *Sec'y*,  
Lincoln, Nebr.

### Pennsylvania Board of Examiners.

THE next meeting of the Board of Dental Examiners of Pennsylvania will be held in

Philadelphia and Pittsburgh, on Wednesday Thursday, Friday, and Saturday, June 23, 24, 25, and 26, 1920. The theoretical examinations will be held at Musical Fund Hall, 808 Locust st., Philadelphia, and at the College of Pharmacy, Bride and Bluff sts., Pittsburgh. These examinations will begin on Wednesday, June 23d, at 9 A.M., and will continue Thursday and Friday. The examination in practical work will be held on Saturday, June 26th, at 8.30, and will be held at the Evans Institute, Fortieth and Spruce sts., Philadelphia, and the University of Pittsburgh, Pittsburgh.

Application papers may be secured from the Department of Public Instruction, Harrisburg. For further information apply to

ALEXANDER H. REYNOLDS, *Sec'y*,  
4630 Chester ave., Philadelphia.

### Vermont Board of Examiners.

THE next meeting of the Vermont Board of Dental Examiners for the examination of candidates to practice in Vermont will be held at the State-house, Montpelier, June 28, 29,

and 30, 1920. Candidates will present for registration and preliminaries at 10 A.M., Monday, the 28th.

To be eligible for examination a candidate must be (1) twenty-one years of age, (2) a graduate of a high school of the first class, (3) a graduate of a reputable dental college. Applications must be in the hands of the secretary not later than June 21st.

For further information and application blanks, address

HARRY F. HAMILTON, *Sec'y*,  
Newport, Vt.

### Maine Board of Examiners.

THE regular meeting of the Maine Board of Dental Examiners will be held at the State-house, Augusta, Me., July 7, 8, and 9, 1920, beginning at 8.30 A.M., July 7th.

All applications must be in the hands of the secretary on or before June 28, 1920. Fee for examination—dentists, \$20; dental hygienists, \$10. Any further information and application blanks will be furnished by addressing

HENRY GILMAN, *Sec'y*,  
192 State st., Portland, Me.

## UNITED STATES PATENTS PERTAINING OR APPLICABLE TO DENTISTRY

ISSUED DURING FEBRUARY 1920.

### February 3.

- No. 1,329,837, to JACOB HOOK. Dental floss-tape lip protector.  
No. 1,329,980, to NICHOLAS LAUDIERO. Toothbrush.

### February 10.

- No. 1,330,525, to JACOB GOLDSTEIN. Rotary toothbrush.  
No. 54,425, to THEODORE G. LEWIS. Design for dental flask.

### February 17.

- No. 1,331,302, to VINCENT S. WICKHAM. Apparatus for trimming odontological casts.  
No. 129,324, to THE AUSTEN COLOGNE Co. Trade-mark for toothpowder.  
No. 129,365, to THE F. M. KEELER Co. Trade-mark for toothpaste, toothpowder, den-

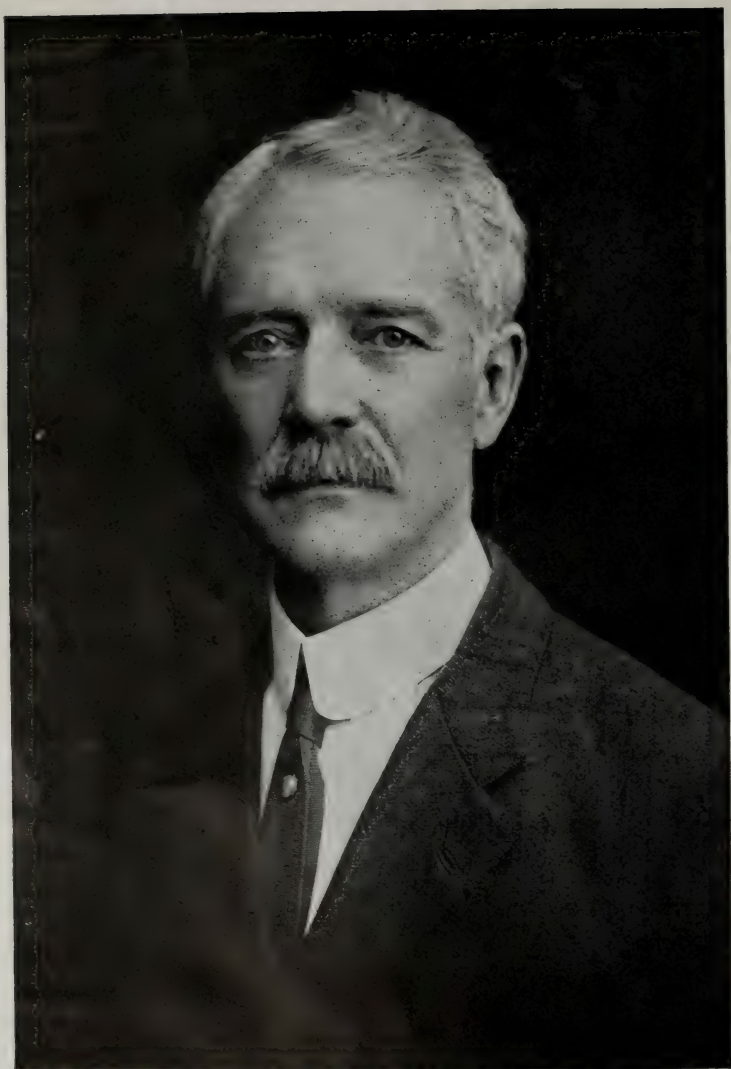
tifrice, toothache gum, toothache drops, and aseptic wash.

### February 24.

- No. 1,331,660, to MORTON H. and JAMES C. MORTONSON. Dental casting machine.  
No. 1,331,805, to ALBERT CHANCE. Syringe.  
No. 1,331,974, to ASMUS C. SCHAUANGEL. Prosthesis.  
No. 1,332,170, to WILLIAM T. ELZINGA. Dental floss holder.  
No. 129,416, to CHARLES W. ARCHER. Trade-mark for preparation for the treatment of pyorrhea.  
No. 129,418, to THE ARMAND Co. Trade-mark for facepowder, cold cream, hairwash, toothpaste, rouge, shampoo preparations, and perfume.  
No. 129,529, to MAX ROBINS. Trade-mark for toothpaste.







DR. J. A. LIBBEY.

# THE DENTAL COSMOS

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VOL. LXII.

MAY 1920.

No. 5

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## ORIGINAL COMMUNICATIONS

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### Dental Sepsis in Its Relation to Ocular Disorders.

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By G. E. DE SCHWEINITZ, M.D., Philadelphia, Pa.

PROFESSOR OF OPHTHALMOLOGY, UNIVERSITY OF PENNSYLVANIA.

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(Read before the Pennsylvania Association of Dental Surgeons, Philadelphia,  
February 10, 1920.)

IT is with no little satisfaction that I embrace the opportunity of addressing this distinguished Association of Dental Surgeons on a subject alike of interest to them and to ophthalmologists, and I beg to express to you my high appreciation of the privilege granted to me through your kind invitation.

It does not seem necessary on an occasion like the present one to analyze the large literature which is available both from the dental and the ophthalmic standpoints, but it is not without interest briefly to refer to a few of the earlier writings on this topic, if for no other purpose than to demonstrate that observations now being daily made were also in evidence many years ago, although the accurate etiological relationship between diseases of the teeth and those of the eye was not properly understood.

For more than a hundred years ocular disease and dental distress have been

brought into relationship with each other, and scattered through the older literature cases of this character will often be found. Anyone interested may with profit consult, for example, the bibliography in A. D. Black's article "Ocular Diseases Resulting from Dental Lesions" (*Ophthalmic Record*, Vol. xxiv, 1915, page 610) and the files of your own well-known publications, for example, the *American Journal of Dental Science* and the DENTAL COSMOS.

Doubtless all of you have read the excellent essay of Dr. Albert P. Brubaker, "Reflex Neuroses Associated with Dental Pathology," published in 1887 (*American System of Dentistry*), written, as the author states, with "the design . . . to present a collection of those cases, medical, dental, or neurological, which show the mutual influences and interactions of the teeth and other structures of the body." Pathological conditions of the teeth, it was believed

at that time, might result in ocular disorders by the intermediation of the nervous system, and even now certain writers are inclined to cling to a group of so-called reflex neuroses which present themselves as sensory, vasomotor, or muscular disorders of the eyes. With this group we have no special concern this evening.

In Dr. Brubaker's collection we find, among others, muscle palsies, cycloplegia, "neuralgia of the eye," scleritis, keratitis, and amaurosis (probably retrobulbar neuritis) attributed to dental infections. None of these records was made less than thirty-five and some of them more than fifty years ago, and doubtless in all instances, as proved by the subsidence of the ocular affection after treatment or removal of the diseased teeth, the relation of the teeth to the disease was correctly diagnosed, even though the exact mechanism of this relationship was not understood, that is, the rôle of bacterial infection and toxins was not known as it is in our day.

More than forty years ago the late Mr. Edward Nettleship<sup>1</sup> recorded the case history of a patient with exudative choroiditis and punctate keratitis (uveitis) where a carious and aching tooth was thought to have an etiological influence, and gradually the important relationship of oral sepsis and ocular diseases began to be studied, very accurately studied in England; and in this and our own country, as well as elsewhere, observations rapidly accumulated both from the clinical and experimental standpoint, until at the present time there is no better established etiological relationship than that which exists between septic foci in dental areas and certain diseases of the eye, notably those of the uveal tract. I am speaking now only of ocular diseases and dental sepsis and making no particular reference, except in so far as shall presently appear, to other sources of focal infections in their relation to ocular disorders on the one hand and, on the other, to the larger subject of general disease

or special implantations of infection in other organs called into existence by focal infections elsewhere placed and active.

With the statistical data indicating the frequency of dental sepsis you are all entirely familiar; with that which pertains to causal relationship between oral infection or sepsis and ocular diseases you are also doubtless acquainted.<sup>2</sup> But it may not be out of place to quote some British statistics. William Lang<sup>3</sup> in an examination of the histories of 10,000 private patients, found 215 case records of eye inflammation caused by sepsis, 139 of them having been attributed to pyorrhea alveolaris. In these 215 septic cases the iris was affected 87 times, the ciliary body 79, and the choroid 65 times. B. T. Lang<sup>4</sup> in 71 out of 176 cases of inflammatory lesions of the eye traced the cause of the ocular lesion to oral sepsis. Charles Goulden,<sup>5</sup> among a total of 6835 patients, found 173 examples of disease of the uveal tract, which are from the etiologic standpoint enumerated in a tabular manner. In this list there are 142 cases of iridocyclitis, and a diseased mucous membrane was found in 78 of them. Of 9 cases of disseminated choroiditis, in 1 a diseased mucous membrane was found to be the cause. Four cases of a solitary patch of choroiditis with punctate keratitis were all thought to be due to infections of mucous membranes. Goulden believes that two conditions of the teeth may cause infection of the uveal tract, an abscess in connection with a single tooth and pyorrhea alveolaris, many tooth sockets being affected.

In this connection the research undertaken at the University of Minnesota Hospital may be referred to. In an effort to correlate oral sepsis with sys-

<sup>2</sup> Consult also Rosenow, "Focal Infection with Special Reference to Oral Sepsis," *Journal of Dental Research*, Vol. i, No. 3, Sept. 1919; H. L. Ulrich, *Journ. A. M. A.*, Nov. 6, 1915.

<sup>3</sup> *Lancet*, May 17, 1913.

<sup>4</sup> *Brit. Med. Journ.*, Feb. 22, 1913.

<sup>5</sup> Royal London Ophthalmic Hospital Reports, xix, Part 3.

<sup>1</sup> Royal London Ophthalmic Hospital Reports, Vol. ix, Part 2, 1879, p. 182.



temic lesions, special inspection of the patients' mouths was made for pyorrhea, gingivitis, caries, and by means of X-rays for apical abscesses. The results of this research are recorded by H. L. Ulrich. In a little over 68 per cent. of all artificially devitalized teeth apical abscesses were found.

While I have not at hand accurate numerical data in my own experience as to the frequency with which with the aid of expert dental examination foci of infection in dental areas have been found in association with diseases of the uveal tract, the percentage, although in a much smaller number of cases than those quoted from the British authorities, is as high as that recorded by B. T. Lang and other observers.\*

Ophthalmic as well as dental surgeons are now well aware that it is not necessary that a general oral sepsis, or an extensive pyorrhea alveolaris shall be present to create an iridocyclitis or uveitis. The infection may come from a tooth-root abscess and not infrequently from a "blind abscess," the presence of which is unsuspected, pulpless teeth and blind abscesses being, to quote Rosenow, the most dangerous form of dental sepsis.

But the matter does not end here. It has been definitely shown that the mere extraction of affected teeth does not necessarily eliminate infection which may be present in periodental areas. Moreover, even in those patients who have "lost all their teeth," to use a common expression, the jaws may not be above suspicion; they may, as must be well known to all of you, to quote again from Rosenow, "still harbor localized areas of infection." Thorough examination must

be the rule by means of X-rays and other methods of precision. One of the most useful lessons learned in my young days while serving an internship in a hospital is contained in a sentence delivered to me by one of my chiefs after I had failed to recognize the cause of a certain train of symptoms: "Doctors fail not so much because they don't know, but because they don't properly examine."

In so far as our present knowledge extends, it is safe to say that by far the greatest number of cases of inflammation of the uveal tract, that is, of uveitis or iridocyclitis, are of septic or toxic origin. Syphilis continues to hold its position as the chief instigator of various types of iritis and iridocyclitis; tuberculosis and gonorrhea play an important rôle in this regard, but "rheumatism," at one time maintained as the etiological factor next only in importance to specific infection, has been relegated to the background, provided the term serves to indicate the infection known as acute rheumatism or rheumatic fever. Iridocyclitis of the ordinary type (I omit extended descriptions of the purulent types which may arise from metastases of streptococci from purulent processes in the joints) is rarely, if ever, coincident with acute rheumatism.

On the other hand, the subjects of so-called muscular rheumatism or myalgia and various types of chronic polyarthritis are frequently affected with iridocyclitis, and in these myalgic and polyarthritic conditions the toxin or the bacterial element itself comes in many instances from various dépôts of focal infection, among which those in the dental areas hold a conspicuous position. The patient begets uveitis or iridocyclitis or choroiditis, not because he is "rheumatic," but because this is one of the manifestations of the toxemia or infection of which he is the subject, while his muscle, joint, and fibrous tissue pains and lesions, in short, his "rheumatism," are other manifestations of the same cause.

Therefore the old term "rheumatic iritis," except in certain circumstances which are not now in discussion, should

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\* In the discussion some astonishment was expressed that the statistics quoted indicated so great a frequency of dental sepsis as a cause of uveal tract disease. It may be permitted to note, therefore, that the ocular diseases were "attributed to pyorrhea, etc." I do not think the authors intended to imply that every case was *proved* to be of this origin, although evidently in many cases the relief which followed the elimination of oral sepsis indicated a close relationship.

be eliminated, and in place of it the term "toxic" or "autotoxemic" substituted. Ophthalmologists have learned to regard these uveal tract disorders not as independent diseases but as complications; in short, as part of the symptomatology of a toxic state which may have its origin in focal infections, among which, as I have said, oral sepsis takes a prominent place.

Evidently it is not the function of a paper of this character to contain a discussion of the bacterial flora of the mouth, which has been so elaborately studied by many observers and notably by members of your own profession, and which has quite recently been the subject of a notable contribution from the Mayo Foundation.<sup>1</sup> Staphylococci, streptococci, *Streptococci viridans*, and many other organisms, pathogens as well as non-pathogens, are constantly present in areas of dental infection, and it may be not without interest briefly to refer to what may be called the mechanism of focal infections from this source, or indeed any source, and for our purpose, as related to the development of ocular diseases, particularly those of the uveal tract.

Whether the statement of Rosenow that such focal infections "are no longer to be looked upon merely as a place of entrance of bacteria, but as a place where conditions are favorable for them to acquire the properties which give them a wide range of affinities for various structures," shall be accepted, it is not my purpose or province to discuss. As you know, authorities differ in this regard, and some of them believe the evidence on which this theory is based is too much in the nature of a conjecture.

On the other hand, the selective tissue affinity of certain bacteria, *i.e.*, elective localization, is more than a theory, and rests in the opinion of many expert bacteriologists upon a satisfactory foundation. In focal infections, for example, in dental sepsis, to quote John A. Kolmer,\* "bacteria find favorable oppor-

tunities for growth, multiplication, and entrance into the lymphatic streams, not only by means of ulceration, but possibly by being carried in by migratory leukocytes acting as phagocytes. Having gained access to the blood streams, they may be able to resist the bactericidal action of the blood by reason of reduction in the resistance of the blood due to the primary infection. Subsequently they may locate in certain tissues, for instance, the uveal tract, either because they have developed a special affinity for these parts and find conditions favorable for their growth, or because the resistance of these parts is reduced by some other agency and thereby favors the localization of the germ."

The objection that the bacteria come from a primary lesion which is suppurative, while the uveitis or iridocyclitis is non-suppurative, is met by the statement that the micro-organisms decrease in virulence in their contact with blood serum and they are not contained in emboli or blood clots. Even if the organisms are not found in the anterior chamber, it does not prove that they have not been carried there originally, inasmuch as they have been destroyed by the very virulence of the inflammation which they have caused. Moreover, staphylococci have been recovered from the aqueous in these circumstances, vaccines have been prepared from them, and their administration has aided in the cure of the ocular disease.

Whether these forms of iridocyclitis are ever produced by circulating bacterial toxins instead of the bacterial element itself is still in controversy. Although no one has proved that circulating bacterial toxins are not present, which may find in the iris elements for which they possess a specific combining affinity, it is highly probable that in bacterial infections the germs themselves are present rather than their products as toxins and endotoxins, produced in a distant focus.

Finally, as has been demonstrated by competent observers,<sup>2</sup> cultures from infected teeth or pulps injected intrave-

\* Personal communication based on personal work and from a study of the literature.

<sup>1</sup> Rosenow, *loc. cit.*

<sup>2</sup> Rosenow, *loc. cit.*, *Journal of Dental Research*, Vol. i, No. 13, 1919.



nously into rabbits can produce iritis, and cultures from such iritis injected into other rabbits can also create an iritis in them.

We may next turn to what may be denominated the practical consideration of this subject, to wit, the relationship of dental investigation in determining the therapeutic measures required by diseases of the uveal tract in particular, as well as certain other affections of the eye. In a sentence, it may be stated that inasmuch as we know both from the clinical and experimental standpoints that dental sepsis of itself may originate an iridocyclitis or similar ocular disorder, no ophthalmologist worthy of the name would fail to co-operate with a dental surgeon in his study of the cases of uveal tract affection not definitely proven to be the result of some cause other than one which might arise in the mouth. Indeed, I would go further and urge a similar co-operation even if, for example, the patient with iritis or iridocyclitis is the subject of syphilis or other generalized infection, for reasons which I shall presently state.

Evidently, to prevent bacterial metastases, the primary focus of infection must be eradicated. Whether such eradication shall be secured by surgical extraction of the offending tooth or teeth, or by other methods of sterilization, is a question to be decided by the dentist, and it must not be forgotten, referring to a previous part of this paper, that mere extraction does not always remove the focal infection, that it may exist as a very small area of itself practically symptomless, and that the toothless mouth is not necessarily above suspicion.

What shall be done in the event of the discovery of more than one focus of infection, let us say in the teeth and in the tonsils? Which focus shall take precedence in the eradication of the local sepsis? Rosenow,<sup>1</sup> referring to this point, says: "In the matter of eliminating foci of infection in the mouth and throat, the infections about the teeth as a rule should be corrected first. Tonsil-

lectomy, as now so continuously practiced before the condition of the teeth has been corrected, is illogical. The lymphatics of the mouth and jaw drain into the tonsils. Some infections of the tonsils improve, or even disappear following extraction of infected teeth." On this subject I hope there will be an expression of opinion from the dental surgeons. Personally, I cannot understand why an infected tonsil should remain, or why both the offending teeth and the tonsils should not be corrected. If I had to dictate the precedence of action, because I have more often apparently found a cause of iritis resident in the tonsil than in the teeth, I would be inclined first to eliminate the tonsils, but I would remember the teeth in later action if necessary.

Does the establishment of syphilis, for example, abrogate the need of search for focal infection in a patient with uveal tract disorder? A man in the late twenties consulted me because of failure of ordinary treatment to relieve a violent and apparently progressive uveitis with deep anterior chamber keratitis punctate and vitreous infiltration. He had a perfectly clear history of syphilitic infection with the usual secondary manifestations, and for a period of time prior to his eye inflammation had been under treatment for a specific throat affection. The ocular disease was unsatisfactorily influenced by thorough mercurial treatment (neither salvarsan nor neosalvarsan was used). It equally resisted very large doses of salicylates and thorough intestinal antisepsis. Examination revealed that the teeth and tonsils were in good condition, but some purulent pockets were found in the right ethmoid, and after this region was brought into a normal condition the ocular inflammation subsided with almost startling rapidity.

It is of course perfectly possible that from the very beginning this may have been a uveitis due to infection from a purulent ethmoiditis, and that the original specific infection had nothing to do with the iridocyclitis. Be this as it may, the mere presence, or probable presence,

<sup>1</sup> Rosenow, *loc. cit.*



of some such well-known etiological factor as syphilis should not in itself prevent a search for focal areas of infection as they have been described. In this particular instance an ethmoidal focal infection was the aggressor; it might just as well have been an apical abscess.

The need of repetition of examinations, as well as extended examinations of areas which experience has taught are apt to harbor focal infections, is illustrated by the following case history: A single woman of middle life, eight years prior to examination, had a severe attack of uveitis of the left eye, and in more recent years repetitions of this attack. She had from the very beginning been most carefully treated. Serological tests and tests for tuberculosis had been negative. There had been no failure carefully to examine the sinuses, naso-pharynx, etc., and particularly the mouth. She was the subject of marked Riggs' disease. When she came under my care many of these examinations were repeated, confirming the results which had been obtained elsewhere. X-ray examination of the teeth, however, had not been made, and this revealed four typical apical abscesses at the roots of the lower incisors. These teeth were removed and the cavities sterilized. The advice that a metabolic study should be undertaken was followed, and the examinations were made by Dr. Alonzo Taylor, who reported, after a study which extended over six days, as follows: "The urine and stools contain amines of the histone fraction of proteins, due to abnormal secretion of intestinal bacteria. The patient has intestinal stasis, and an abnormal flora in the intestines. I do not suppose, offhand, that the substances identified are in themselves responsible for the eye lesions, although imimazol-ethyl-amin is known to be toxic to the circulation; but they indicate definitely the existence of an abnormal bacterial decomposition within the intestine, the germs of which we would expect to form toxins of their own."

Evidently the value of treatment which was determined by Dr. Taylor's examination was useful in restoring this

patient's resisting power and rendering her less liable to an attack of uveal tract inflammation of her right eye. This patient's history furnishes a good example of the fact that the sources of infection may come from various regions in one and the same subject, sinuses, teeth, intestinal tract, and that therefore the discovery of a single focal infection, for example, at the root of a tooth or in a tonsillar crypt, should not check the search for septic areas elsewhere in the body.

The relation of dental sepsis to the relapses to which autotoxemic iritis is subject—the so-called recurrent iritis—is most important. Thus the removal of an offending tooth may be followed by recovery from the iritis inflammation. In the course of time a renewal of the iritis may take place because of new areas of dental sepsis or others not previously discovered. This is not an uncommon occurrence.

Are ocular disorders ever unfavorably influenced by the extraction of infected teeth? We are all aware of the fact that a tonsillectomy may sometimes be followed by a sharp exacerbation of the inflammatory or infected process in an organ, for example, the eye. A few years ago a lad of nineteen, the subject of relapsing uveitis traced, it would seem, to moderately infected tonsils (all other examinations were negative), submitted to a tonsillectomy. Within twenty-four hours after the removal of the tonsils he experienced a sharp relapse of the uveitis. After this was brought under control the eye progressed to complete cure and recovery of perfect eyesight. Surgeons will testify, I think, that relapses of arthritis may follow a like surgical procedure. Recently I have seen a boy with an infected ulcer of the cornea apparently due to an abscessed tooth. This tooth was removed, and almost immediately there followed an adenitis of the neck ipsilateral to the infected tooth, and with a smart increase in the corneal ulceration. Later adenitis and keratitis disappeared. These cases are quoted not in criticism of dental or tonsillar surgery but as illustrating an occasional

complication, which of itself is apparently not productive of permanent disaster. The relapse probably indicates the sudden release of a shower of bacteria which are carried to the inflamed and poorly resisting organ, in the instances quoted, the eye. Indeed, if anything, the relapse is an indication of the relation of the focal infection to the diseased organ.

What is the relation of unerupted teeth to ocular disorders? I am not infrequently asked to give an opinion on this subject, and hope the dental surgeons present will make expression of their experiences. I do not now refer to the effect of such teeth in causing, for example, facial neuralgia or certain reflex symptoms, but whether they can originate an inflammatory disease of the eye, for instance, a uveitis. In my own experience I have never observed a uveitis, for example, which could be traced to a non-infected, impacted molar, although I have once quite recently studied a patient with one of the forms of unilateral retrobulbar optic neuritis with such a molar on the same side, where the ocular disorder rapidly disappeared after removal of the tooth. It is, however, fair to state that much prior treatment had started the patient well on the way to recovery, which might therefore very well have taken place without the elimination of the buried tooth. Evidently the condition of the impacted tooth and its surroundings must largely determine the need of surgical interference.

My reason for referring especially to this part of the subject is that there seems to be a good deal of difference of opinion as to the harmful effects of impacted teeth, on the one hand, and on the other of the tendency to ascribe to them influences which they do not possess. Thus, I have heard a prominent dental surgeon urge the removal of an impacted molar for the relief of choked disk due, as it was proved by autopsy and evident by the clinical symptoms, to a tumor of the cerebellum. Recently I have examined two patients, one with a well-known type of choroiditis due to an equally well-known cause, and the other

an old man with a typical so-called senile macular degeneration, where in each instance a buried tooth was insistently brought forward as the causal factor.

Whenever striking, not to say startling, advantageous results follow certain therapeutic procedures, there is a tendency on the part of those concerned to narrow their points of view, "to ride a hobby," as we are wont to express it. There are sure to develop, on the other hand, antagonisms, and neither those who recklessly advocate, nor those who stubbornly oppose, are correct. Each misses the path of safety and the value of scientific investigation followed by recommendations tempered with sound judgment.

There is no manner of doubt that many teeth have been needlessly sacrificed, and this is equally true of many appendices, many foreskins, many tonsils—the list is a long one. But he is just as wrong who disdainfully disregards careful dental examination because, forsooth, he chooses to regard the whole matter as a "fad," as is he who suspects every tooth and extracts too many. No sane physician, surgeon or dentist will fail to agree that the not infrequent unnecessary sacrifice of vital teeth should be condemned. As L. F. Barker has well said, "a tooth should not be sacrificed unless indications are clear for its removal, and widespread orders to extract teeth unless they are so diseased that they should come out should not be given." On the other hand, as he further says, to try and save teeth which cannot be made aseptic is unwise, not to say foolish, for they may be, and the danger is a real one and has now many times been definitely demonstrated, the cause of general and local disease such as we have discussed this evening.

A few weeks ago I examined a comparatively young man who was literally toothless because he had a form of axial atrophy of the optic nerves, which was due to the abuse of alcohol and tobacco, and which yielded promptly to the usual measures—abstinence and elimination treatment. Again I studied a patient



within the last year with a central scotoma apparently also due to a chronic retrobulbar neuritis, whose teeth were a marvel of the gold-filling art and of bridge work. It seemed almost a sacrilege to suspect them, but X-ray examination revealed what was beneath, and with the eradication of the covered-in septic areas the visual difficulties disappeared. It is not for me to dwell on the lesson which such a case teaches. I know how carefully this is being considered in scientific dental circles.

Speaking purely as an ophthalmologist I desire to say this, and I know my ophthalmic *confrères* will agree with me, namely, that the proper management of cases of uveal tract disorders, in particular of some forms of keratitis and of certain disorders of the retina and of the

optic nerve, demands the co-operation of the physician, the ophthalmologist, the otolaryngologist and the dental surgeon. These cases must be studied from all standpoints, and sources of infection eradicated or sterilized. Co-operation is the master word in this business. We must act not along the lines of ill-considered and reckless sacrifice, but with due care and judgment, weighing the evidence as it presents itself from the investigation of all sources from which the etiological factor may spring and not from one alone. Working thus "in perfect sympathy and uncontenting equity," we who are banded together for the relief of human suffering and the prolongation of human life shall achieve what must be our professional aim—the cure of those who seek our advice.

1705 WALNUT ST.

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## Dental Education in the Schools of Nassau County, New York.

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By W. J. MULTER, Supervising Principal, Roslyn, N. Y.

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THE schools of Nassau County, New York, are doing a most important pioneer work in the matter of health education. A careful study of the statistics gathered through the medium of the medical inspection of school children, which is made compulsory by law, reveals alarming dental conditions among school children. These statistics show that for every child attending school, there is more than one physical defect which may be corrected, and further investigation also shows that in some localities fully 75 per cent. of the absences due to illness may be traced to defective teeth. In every case the school records show that between 90 and 95 per cent. of the school children need dental attention.

Many of the small towns having a population of from two to four thousand have no dentist, and this means that in such towns there has hitherto been no opportunity provided either for adults or school children to receive the necessary dental attention without great inconvenience. Some of the more thoughtful parents desired to take their children to dentists in some distant village, but in doing this they had to lose from one to three days' work, and the children had to be kept out of school for that length of time. Efforts on the part of the school authorities, therefore, to get oral defects corrected were sometimes met by direct refusals from the parents and oftener checked by the realization that pupils traveling to the dentist lost too



much valuable time from school. There seemed to be an eager desire on the part of both the American and foreign parents to provide their children with this necessary dental service when these matters were brought to their attention and carefully explained, but there was a lack of opportunity. Moreover, complaints came from the fathers of large families that they could not meet the expense of having work done in private practice.

portant health problems of the day. This health program includes not only the correction of the dental defects and dental education, but also the establishment of a county hospital for school children, and a mobile eye clinic. The matter of the establishment of the hospital is well under way, and the mobile dental clinics are a reality. After the project had been approved by the Nassau Chapter of the American Red Cross and the Atlantic

FIG. 1.



It was very evident then that, if parents were reluctant to take their children to the dentist, the dentist must be brought to the children, and the cost of correcting mouth conditions must be brought within reach of those who could not afford to pay the prices charged in private practice. At a conference of the writer with Mrs. E. C. Brower, Chairman of the Junior Red Cross of Nassau County, he suggested that the matter of improving the physical condition of the school children be adopted by the Junior Red Cross as the most important phase of its peace program. The Red Cross officials were quick to recognize the importance of this work and are now busily engaged in solving one of the most im-

Division, the local chapter set aside \$15,000 to purchase dental educational cars, Archer prophylactic chairs, with other dispensable and non-dispensable equipment; a Waugh X-ray outfit and to pay the salaries of five competent dentists.

Whenever application is made for dental service by a school, a Junior Red Cross dentist is assigned to that school for a length of time in proportion to its registration and the approximate number of pupils who are to receive dental service. On the first day, upon the arrival of the car, the equipment is removed from the car to some convenient room in the school building which is to be used for the dental clinic. Then the

Junior Red Cross dentist in charge spends the greater part of the first day in making examinations of the children's teeth, usually with the assistance of the school nurse or a teacher. Mouth charts are made in duplicate which show exactly what work should be done and what the cost charge would be for putting the child's mouth into a healthy

portant. That is to say, children, and adults too, learn the importance of good dentistry, and in villages where the services of a local dentist are available they are in great demand as a result of our educational campaign. Needless to say, the dentists in the villages where we have operated are loyally supporting us, and they say that the mere presence of the

FIG. 2.



condition. The combination notice and consent card is made out as shown in the illustration and sent to the parent, together with a copy of the mouth chart. If the parent desires to have the child's teeth attended to, he signs the consent card and returns it to the school, and an appointment is made for the pupil. In nearly every case the parents have been so eager to have this work done that they have voluntarily paid the cost charge in advance (Fig. 3).

We find that the educational feature of this project is by far the most im-

portant. That is to say, children, and adults too, learn the importance of good dentistry, and in villages where the services of a local dentist are available they are in great demand as a result of our educational campaign.

Needless to say, the dentists in the villages where we have operated are loyally supporting us, and they say that the mere presence of the dental car in front of the village school-house has a surprising educational value. Soon after a clinic is opened in a school, an illustrated talk is given to the school children upon the subject of oral hygiene. In order to reach the homes through the children there has been prepared a series of blotters like that illustrated (Fig. 4), giving such information relative to the care of the teeth as children and adults should know. We have found that in too many instances pamphlets and circulars containing this information have been thrown



into the streets by the children, but when this information is placed upon some useful article, such as a blotter, in nearly every instance the child takes the blotter

has been found that dental service can be rendered at a cost charge which almost every parent can afford. Deciduous teeth can be extracted for from twenty-

FIG. 3.


Roslyn N. Y. Oct. 17, 1919

TO THE PARENTS OF Martha Smith

Your child Martha needs dental attention. This is the time to have the small cavities filled to prevent future loss of the teeth. If you have a regular dentist will you please take your child to have these cavities filled while most of them are small. If you have no regular dentist and wish them taken care of in school, at a cost charge, by the Junior Red Cross Dentist, please sign the attached card and return to the teacher.

M. J. Multer  
Principal Nurse Teacher

JUNIOR RED CROSS



NASSAU COUNTY, N. Y.

TO THE JR. RED CROSS DENTIST:

work for my child Martha. You are hereby authorized to do any dental work that you may deem necessary, said work to be done at a cost charge of \$ 2.25. I agree to pay this charge in advance or upon the completion of the work.

Frank Smith  
Parent or Guardian

Dated October 19, 1919

home. In an effort to keep the importance of this work before the minds of the pupils, each pupil patient receives a button upon the completion of his


five to fifty cents and permanent teeth, where it is so often necessary to resort to conduction anesthesia, for one dollar. Amalgam fillings can be inserted at

FIG. 4.

## THE SIX-YEAR MOLAR--

THE MOST IMPORTANT TOOTH

1. The six-year molar appears in the mouth in back of all the baby teeth at six years of age and no baby tooth is lost to make room for it.
2. In one half of the children these teeth start to decay when the children are seven or eight years of age. At nine years of age the teeth are badly decayed and when extracted are never replaced by others.
3. All children should be taken to a dentist when three years of age, and thereafter about every three months for examination.




**BAD TEETH AND LACK OF TEETH  
CAUSE BAD HEALTH**

---

Go to a Good Local Dentist  
Avoid the Cheap Advertising Dentist

---

Distributed to the School Children of Nassau  
County, New York



JUNIOR RED CROSS of NASSAU CO., N. Y.

work, which he proudly displays to his fellow students. This button bears the slogan: "Clean Teeth—Nassau County" (Fig. 7).

After experimenting for some time, it

prices varying from fifty cents to one dollar and a half; fifty cents is charged for prophylaxis, and a porcelain filling costs from seventy-five cents to one dollar. Between September 8, 1919 and

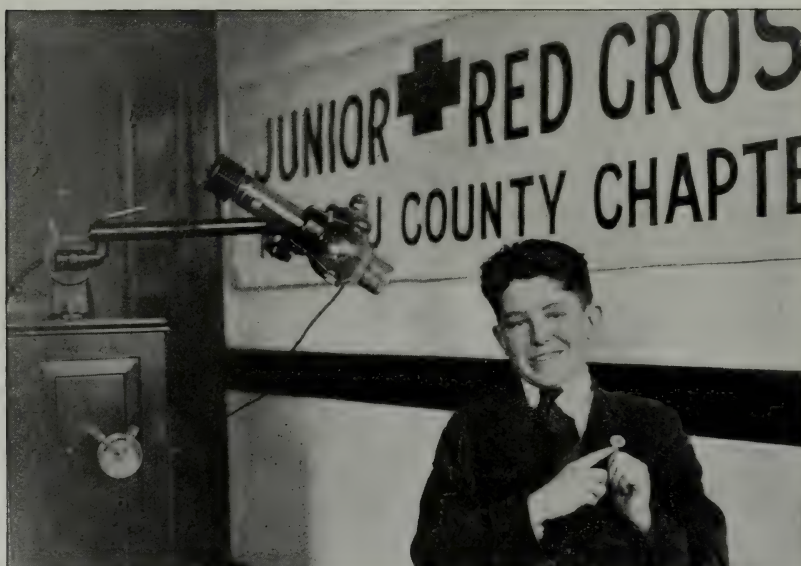


February 1, 1920 there have been placed in operation five mobile dental dispensaries, having an average operating period of fourteen weeks and two days each. A fair measure of the relief which may be rendered in rural communities by such dispensaries may be taken from a consideration of the following summary of the reports from our dispensaries during the past month of January, the only calendar month in which all of the dispensaries were in operation

\$3.73 has been made to make all the necessary corrections in the average child's mouth. The total charge for the work done was \$1202.70, which has more than paid the operating expenses of the five dispensaries for that month.

It is impossible for me, in behalf of the school officials administering this health project, to express adequately their appreciation of the moral and financial support received from the American Red Cross. This marvelous

FIG. 5.



for an uninterrupted period of four weeks:

In approximately 468 hours 322 children received dental relief, requiring 605 sittings; from the mouths of these children were extracted 142 first molars and 150 other teeth, which were mostly deciduous teeth; 1121 cavities were filled and the teeth of 219 received prophylactic treatment. The roots of 16 first molars were filled requiring 219 treatments. A total of 1750 corrections were made, which is an average of 5.4 corrections for each child. An average charge of 69 cents has been made for each correction, or an average charge of

organization was willing to try the experiment, trusting that should it prove successful, it would be recognized as a plan worthy of public adoption and support.

It must be understood that the Junior Red Cross is not dispensing charity except in a few isolated cases where, with the approval of the principal of the school, inquiry as to the conditions in the home has produced facts which warranted our doing the work at less than cost. The poor people of today are not all poor because of lack of money; some are poor on account of a lack of knowledge of the use of money.

FIG. 6.

**Junior Red Cross**  
Nassau County, New York

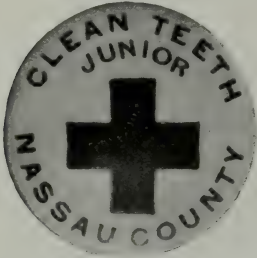
**SCHOOL DENTAL DISPENSARY REPORT**

SCHOOL DISTRICT NO. 3TOWN OF N. HempsteadDATE 10-22-1919NURSE Martha P. Stark, R.N.

PUPIL'S NAME	FILLINGS				TEETH EXTRACTED	ROOTS EXTRACTED	TREATMENTS	ROOT FILLING	PROPHYLLAXIS	MISCELLANEOUS	CHARGE FOR ENTIRE WORK	AMOUNT PAID	REMARKS
	AMALGAM	PORCELAIN	CEMENT	OXYPHOSPHATE AMALGAM									
													<i>Dr. Follett</i>
<i>Homerat, Helen</i>	1										1 00		<i>9:00 to 9:25</i>
<i>Pearson, Myrtle</i>	1							1			1 00		<i>9:25 to 9:45</i>
<i>Flammer, Ernest</i>	1							1			50		<i>9:45 to 9:55</i>
<i>Peters, Mabel</i>							<i>Conductive Anesthesia</i>						<i>10:00 to 10:10</i>
<i>Fairchild, Richard</i>					1						50	4 50	<i>10:10 to 10:15</i>
<i>Peters, Mabel</i>					1						1 00	1 00	<i>10:15 to 10:20</i>
<i>Lynch, Elmer</i>	2						<i>Conductive Anesthesia</i>				1 50	2 00	<i>10:30 to 10:45</i>
<i>Pontifex, Ralph</i>							<i>1 Anesthesia</i>				1 00	1 00	<i>10:45 to 11:30</i>
<i>Fairchild, Jane</i>											00		<i>11:30 to 11:40</i>
<i>Smith, Dorothy</i>	1							1			2 00		<i>11:40 to 12:00</i>
<i>Conkhis, Elmer</i>					1						50		<i>1:00 to 1:20</i>
<i>Fairchild, Jane</i>	1										1 50	1 50	<i>1:20 to 1:50</i>
<i>Phillips, Grace</i>	4										2 50		<i>1:50 to 2:25</i>
<i>Wonghty, Donald</i>	3										1 50		<i>2:25 to 3:00</i>
<i>Blumlein, Eliz.</i>												1 00	
<b>TOTAL</b>											<i>14 50</i>	<i>11 00</i>	

This project has received the hearty indorsement of Dr. Wm. A. Howe, Medical Inspector, New York State Education Department; in fact, the lantern slides used in our educational lectures have been furnished by the Visual

FIG. 7.



Instruction Division, and the work has been carefully inspected and approved by Dr. William H. Leak, Oral Hygiene Inspector, who has given many valuable suggestions, and who has expressed his appreciation of the wonderful service rendered in teaching children to care for their teeth. It is probable that the

successful operation of these Mobile Dental Units in Nassau County will reveal the necessity for legislation making this type of health education compulsory in New York State.

What is being done in Nassau County can be done elsewhere. There are about thirty thousand pupils registered in the sixty-five school districts, which vary in size from the one-room school building to the city school system, and every type of family is represented on the school register. The clinic is equally as successful in the school where 75 per cent. of the children are of foreign parentage as in the school where such children are hardly known. The physical examination of the youths who went to make up our National Army revealed some startling facts, and the early correction of a physical defect is now considered of the greatest importance. Here is a program having the indorsement of the National Red Cross, which may be and should be adopted by every Junior Red Cross Chapter or similar organization that is awake to one of the greatest needs of our country.

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## Rural Dental Service in New York State.

BY WILLIAM H. LEAK, D.D.S., Albany, N. Y.

ORAL HYGIENE INSPECTOR, N. Y. STATE DEPARTMENT OF PUBLIC EDUCATION.

NO little credit must be given to the Junior Red Cross of Nassau County, N. Y., and particularly to Mr. W. J. Multer and Mrs. E. C. Brower, for the establishment of an excellent Rural Dental Service. It is they who evolved the idea, originated the plans of organization and maintenance and had the enthusiasm, courage and energy to make it possible. The work which the dental profession has been doing for years in promoting oral hygiene is beginning to bear fruit. Here we have another example of persons outside of our profession who have the right conception and the charity to assist children to fortify their health by having proper dental conditions.

Since the work, as outlined by Mr. Multer, is directly associated with the school authorities, and because of my official position directing the oral hygiene work of the New York State Education Department, I was requested to meet with the Red Cross organization last June to consider this work, and late in September spent a day in investigating the work as it is being done. In the main I am heartily in favor of the plan and it is unquestionably rendering a most wonderful service in teaching the children to take care of their teeth and by doing actual work for them. There is one danger in the work, the danger of socializing dentistry which is of course no more desirable than the socializing

of any other profession, trade or business. When the proposed plan is rightly understood and if it is followed out, there is no such danger. Quoting from a letter from Dr. Farrand, official head of the American Red Cross, in relation to this dental service in Nassau County, he says:

Our thought and recommendation in this matter is that we should not commit ourselves to any policy of supporting permanently free dental clinics, but rather to a policy of propaganda that will lead large communities to establish their own independent dental dispensaries, and will influence children of well-to-do parents to consult private dentists.

In this service in Nassau County the dentists are employed but five hours a day for five days a week. This gives them the late afternoon, evenings and all day Saturday to themselves. These six dentists are establishing private offices in separate towns of the county. They will quickly build up for themselves independent practices to such an extent that the salary paid for the school service will not be attractive and they will surrender it. There will then be dentists in the leading towns of the county to whom children may go directly for service, and the time will come when it will only be necessary to do fillings, extractions, etc., for children whose parents cannot afford to pay for dental work.

## Oral Surgical Cases in Practice.

By LOUIS F. ROBICHAUX, D.D.S., San Antonio, Tex.

ORAL SURGEON AND DENTAL CONSULTANT, ROBT. B. GREEN MEMORIAL AND SOUTHWESTERN HOSPITALS OF SAN ANTONIO, TEX.; LECTURER ON BACTERIOLOGY AND HYGIENE, BAYLOR HOSPITAL AND SOUTHWESTERN TRAINING SCHOOL FOR NURSES; LECTURER ON ANATOMY AND PHYSIOLOGY IN LEE SURGICAL HOSPITAL TRAINING SCHOOL FOR NURSES.

### CASE 1.

PATIENT, Miss B., about nineteen years of age, with two lower third molars to extract. Operation performed under nitrous oxid and oxygen anesthesia. Nothing unusual in the recovery except that the patient was very hysterical. One-eighth of a grain of morphin was given hypodermically and she left the office in a couple of hours in good condition. Six hours later, however, there was profuse hemorrhage from the socket. After using hot physiologic saline solution, the socket was packed as tightly as possible with cotton wet in thromboplastin which controlled the hemorrhage in about fifteen minutes. Four hours later I was called again for the same condition. I found the patient nervous, hysterical and quite exhausted from loss of blood and lack of rest during the night. She would not allow me to pack the socket again. Ten cc. normal horse serum was administered subcutaneously and hemorrhage ceased in about half an hour. After twenty-four hours the packing was removed and the patient dismissed.

On the fourth day after giving the serum, I was called again and on arrival found the patient with a temperature of 100 and pulse 110. Wound looked well, with no swelling or pus. Severe pains in the abdomen; some nausea. Examination of abdomen showed no rigidity, tympanites, or localized pain in region of appendix; pain seemed to be in the

stomach. I did not suspect appendicitis but rather suspected serum sickness. Put a nurse on the case with instructions to give plenty of water. Twelve hours later all symptoms were worse; constant vomiting and retching; patient could not retain water. Rash developed on arms and abdomen, which confirmed my diagnosis. Heart showed signs of intoxication; gave tincture of digitalis. The next day the pains were almost unbearable, and were controlled with opium suppositories by rectum. Body and extremities being cold, hot water bottles were applied. Vomiting and retching constantly, rash all over body and in the mouth. Gave bismuth subnitrate to soothe the irritated intestinal tract. Called family physician in consultation at this time. Diagnosis confirmed; treatment not changed. Patient vomited a dark fluid which we thought might be blood and in such event serum could possibly have had a hemolytic effect, which would be fatal and no treatment could be offered.

Specimen of urine was taken and showed only slight traces of albumen and no casts, precluding the possibility of a nephritis. After the fifth day, all symptoms gradually disappeared. The unusual feature of this case was the severity of the anaphylactic symptoms.

After the symptoms had set in, I made inquiry of patient if she had ever had a serum used, the answer being negative.



## CASE 2.

Patient, Mr. R., age forty, weight 160, presented with a painless swelling the size of a small marble on the maxilla in the region of the cuspid. On palpation there was fluctuation.

*History.* Three months prior to this time he consulted a dentist about the same condition. The swelling contained pus and was opened and drained, only to return again in about a month, being opened again by the same dentist.

When the case was referred to me, this being the third time the swelling had occurred, the patient was leaving the city to be gone for ten days. X-ray showed a radiolucent area high up over region of cuspid about the size of a pea. The swelling was opened and about one dram of pus drained out. Dismissed the patient with instructions to report upon return to the city. Another X-ray was taken and the findings were the same as before, with the exception that the bone all the way to the second molar was now involved and the wound was still discharging.

*Diagnosis.* I considered the following possible conditions that might exist: Tuberculosis, malignant neoplasm, actinomycosis, sinus infection, devitalized teeth, syphilis. By process of exclusion, each one was eliminated by appropriate methods.

History of syphilis negative. Wassermann showed a two plus. This was reported to the surgeon who referred the case and he said surely there must be some mistake, as he had been the family physician for many years. We decided to have a spinal Wassermann made, which was also positive. Under appropriate treatment the condition cleared up.

The points in this case that I wish to emphasize are that, had any surgical interference been undertaken, the sinus would have been opened, as the wall is very thin in this location and also that we cannot rely on the history obtained from the patient. A good plan is to suspect syphilis in every case and use careful diagnostic methods to rule it out,

but do not rely implicitly upon a Wassermann, remembering that it is only one link in the chain.

## CASE 3.

Patient, Miss M., school teacher, twenty-three years of age. Lower third molar not fully erupted; gum flap over distal portion and infected; some trismus; temperature 100. Advised immediate operation, which was refused. The following palliative treatment was tried: Tissues were irrigated with physiologic salt solution, iodine applied under gum flap, and a course of calomel prescribed. Saw the case twice daily and kept up the treatment. Infection became worse, with increased temperature, sweats, etc. After three days, operated under nitrous oxid and oxygen. Patient put to bed with trained nurse in attendance; irrigated the socket every two hours with Dakin's solution. Prescribed Kalak water and large quantities of water as diuretic; kept bowels open. Patient gradually grew worse; septic temperature curve going to 104°F.; comatose at times. She was taken to hospital and showed swelling size of large marble in temporal fossa close to highest curve line which fluctuated. I operated under local anesthesia, removed about two drams of greenish pus which was beneath the deep fascia. Specimen examined by bacteriologist; report, pure streptococcus. Called consultation at this stage but treatment was not changed. Autogenous vaccines were considered, but temperature showed as many antibodies being made as vaccines could produce. Patient gradually grew worse and on tenth day died in convulsions from streptococcal meningitis.

The question in this case is—Would the result have been different had the operation been performed when the case first presented?

## CASE 4.

Mr. F., twenty-six years of age. Infection around all upper teeth and many lower.

*History.* About ten days previous had



large ulcer on one tonsil; called on rhinologist who treated him, saying that he had an internal infection. After a few local applications the ulcer healed, and now showed a place as large as the rubber on a pencil, deeply excavated where the ulcer had destroyed tissue. I at once suspected Vincent's angina and made smear for laboratory; report, spirochetes of Vincent and fusiform bacilli. The point to consider was, could it not be syphilis too, or ptyalism, as the physician had the patient on mercury. It often becomes more than an academic question as to how we are to handle a case of this kind. The diagnosis was made by a first-class physician. He, however, did not make a Wassermann blood or spinal, only took clinical picture as pathognomonic evidence of syphilis and put patient on the following treatment:

R—Ext. gentianæ	
Massa hydrargyri	a.a. 5i
Ferri sulf. exsiccet	gr. xv
M. Fiat caps. No. 30.	
Sig.—One t.i.d.	

without revealing what he had suspected or without exhausting every means at his disposal to make a diagnosis.

When I was getting the history and inquired whether or not he had ever had syphilis, the patient remarked, "Why, you scare me; is it possible that this could be syphilis?" I told him that it was necessary to go into every detail to make an intelligent diagnosis.

*Treatment.* Mercury discontinued and 5 per cent. chromic acid applied locally twice daily, with careful mouth toilet, and in ten days the case was dismissed.

The comment on this case is, if I had attempted to take blood from the arm or fluid from the spinal canal for a Wassermann, he would have known I was looking for syphilis. In many instances the psychic effect of such procedure (based on no logical reason) makes a nervous wreck of your patient.

In justice to the physician who first saw the case at a time when the mouth symptoms were not pronounced, he could very easily have suspected syphilis and did so, basing his opinion entirely on macroscopic findings.

The main facts in these four cases are reported in the hope that they may be of value to some of the younger members of the profession.

1012 CENTRAL TRUST BUILDING.

## Some Impressions from Reading Discussions.

By FREDERICK CROSBY BRUSH, D.D.S., New York, N. Y.

SOME time ago, while enjoying a vacation far from the maddening crowd, an opportunity presented itself of making the acquaintance of the local dentist. He was a likable, conscientious man ministering to the needs of a territory that comprised a number of neighboring villages. He seldom had an opportunity to come in contact with other dentists, but he was trying to keep abreast of the times by reading the den-

tal journals. His ideas regarding some of the men whose names appear most frequently in the journals were naturally somewhat erroneous.

What seemed to most trouble him was the difficulty of determining what would really be considered the best methods of procedure in various cases. He would read a paper that had been presented before some society and then the discussion that followed, but the various views.

on the subject seemed to differ so widely that it left him confused as to which was right. Scanning the journals with his point of view in mind, it would appear that his confusion is more or less justified. One striking feature of dental discussions is the readiness with which they can be grouped or classified, so to speak. The groups range all the way from speakers who appear to have some knowledge of the subject, confine their remarks to it, and have something worth while to say, to those who offer a few complimentary remarks, ramble off to side issues, and usually say nothing that amounts to much. Another impression from reading the journals is that most men who take part in the discussion of a paper seem obsessed with the idea that they must pick it to pieces or find some point with which they may differ, even if it be no more than a trifling technicality. By the time the various individuals have had their say and the essayist has made his reply, it frequently happens that the general ideas of the subject are somewhat muddled. Such being the case, it is a question whether this manner of discussing a subject is really worth while.

If the publication of the discussions with the papers is for the general enlightenment of the profession at large, does it really accomplish its full purpose, or does it tend to leave the men who are compelled to look to the journals for their information "up in the air," so to speak? Would it not be better to allow the editors of journals publishing society proceedings considerably more latitude in blue-penciling the material submitted to them, cutting out all extraneous matter, and only printing that which has some constructive bearing on the subject? To do so might hurt the pride of some, but if it were done without fear or favor it would increase the real value of the discussions to an extent that would seem to warrant it. Again if more care were exercised at the source (the dental meeting) and less latitude allowed for promiscuous talking, it would help and likewise check the waste of valuable time of men who have

frequently made a considerable sacrifice in order to be present.

In following the proceedings of various societies, it is noted that very nearly the same men take part in the discussions at every meeting, so that by this time it is possible to know approximately their views on almost any subject presented. It cannot be possible that these are the only men in a society capable of expressing an intelligent opinion. It is time that the men who waste valuable time at the meetings with personal bickerings and self-glorification should be relegated to the rear.

The criticism has been made both from within and without the profession that dental ideas and methods never seem to be standardized. It may be possible that these discussions have been a factor in causing this lack of unanimity. Is it not time that a concerted effort be made to correct this fault, and to establish a standard for the methods of general practice? If, when discussing a paper, the men would have this thought uppermost in mind and aim to support the statements of the essayist whenever possible, it would not be long before such a weight of opinion would carry conviction and the idea or method be generally adopted. This would tend to make the general advancement of the profession, as a whole, much more uniform. It might then be claimed that dentists are practicing a profession of established standards rather than of empirical methods.

An incident occurred recently which will serve to illustrate the foregoing idea: There are two men in the profession, one a specialist, the other a critic, who were always crossing swords whenever the opportunity offered. Their remarks were usually aimed at each other rather than the subject under discussion. It tended to hurt more than help both of them in the minds of other men. The specialist was invited to read a paper before a small society of the younger men, and the critic had been invited there to discuss it. The young men evidently expected the usual fireworks. It so happened, however, that the two men



chanced to meet and made the journey to the appointed place together. Being good fellows and friendly in private, they talked the matter over and admitted that they did agree upon all of the essentials of the subject to be presented, and decided that instead of having their usual quarrel over trifles, they would support each other as far as possible, in the hope

of giving these younger men a clearer understanding of the subject. The result was that the young men were unanimous in declaring it the most instructive meeting they had ever attended.

What an improvement it would be if this idea could be followed at all dental meetings!

17 E. 38TH ST.

## A Constant in Pyorrhea Diagnosis that Varies with Anatomical Variation of Tooth Form.

By LOUIS D. CORIELL, D.D.S., Baltimore, Md.

ALL periodontists and nearly all practitioners of general dentistry are called upon to decide whether or not a tooth affected by pyorrhea or other gingival disease can be safely retained and treated.

When such a condition presents itself, it has been largely a matter of guess-work when an opinion is given.

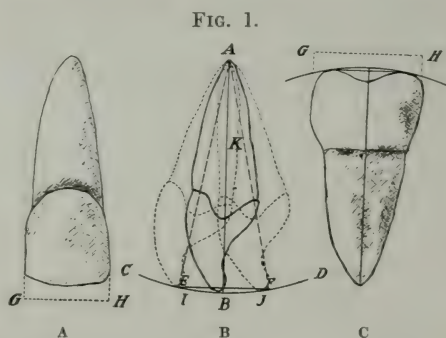
Owing to the lack of any standard by which we may reach a definite conclusion in cases of this kind, I have worked out the following measurements, and after about two years of its application clinically I find that it is a safe, accurate and conservative method to use in making a diagnosis.

It is assumed that the teeth under consideration are either vital or are not periapically infected, that they do not have any vertical movement in the socket (other than the amount allowed normally), that they are not so located in the arch that if the occlusion is traumatic it cannot be corrected by judicious grinding or other mechanical means, and that there is no necrotic cementum present.

In other words the following standard applies to the motility of the tooth in its socket and the amount of move-

ment permissible in a tooth that can be successfully treated and cured.

In Fig. 1B. If the superior central incisor *AKB* sways labio-lingually or mesio-distally or in any direction but vertically, and describes the arc *IBJ* with the vertical axis of the tooth *AB*



as a radius, and if the chord *EF* which subtends the arc *IBJ* does not exceed one-third of the mesio-distal diameter of the incisor at its incisal edge or one-third of *GH* (Fig. 1A) the tooth can be successfully treated and saved.

If we apply the same rule to the rest of the teeth in the arch, it works out as follows:



In the superior central incisors, sway *EF* can equal

$$\frac{GH}{3} \text{ or } \frac{\text{mesio-distal diam.}}{3}$$

In the superior lateral incisors, sway *EF* can equal

$$\frac{GH}{3} \text{ or } \frac{\text{mesio-distal diam.}}{3}$$

and sometimes can equal

$$\frac{GH}{2} \text{ or } \frac{\text{mesio-distal diam.}}{2}$$

In the superior cuspids and bicuspid *EF* can equal

$$\frac{GH}{3} \text{ or } \frac{\text{mesio-distal diam.}}{3}$$

In the inferior incisors (central or lateral), sway *EF* can equal

$$\frac{GH}{3} \text{ or } \frac{\text{mesio-distal diam.}}{3}$$

and sometimes can equal

$$\frac{GH}{2} \text{ or } \frac{\text{mesio-distal diam.}}{2}$$

When we come to the molar region, we have to modify the above formula somewhat, and instead of using the mesio-distal diameter of the tooth under consideration for a standard or constant, we use the bucco-lingual diameter at the occlusal surface midway between the mesial and distal surfaces and instead of dividing this diameter by one-third or one-half, I have found clinically that it has to be divided by one-quarter. Our formula then for the molar region will read as follows:

In the superior and inferior molars *EF* (Fig. 1c) can equal

$$\frac{GH}{4} \text{ or } \frac{\text{bucco-lingual diam.}}{4}$$

I find that the above standard or formula has been most satisfactory and applies equally well to the short as well as the long-rooted teeth, for, as we well know, short roots mean small crowns and long roots, large crowns. Thus as the tooth varies anatomically the constant *GH* will vary accordingly.

The success I have had after adopting and using this formula may be explained histologically by the fact that any more sway allowed than the one given means that all of the fibers around the occlusal third of the root that go to make up the transverse dental ligament have been destroyed, and the greater amount of sway thus permitted is usually fatal to any chance we may have of re-attachment and destroys any granulations that have formed, while the amount of movement permitted by following the above standard seems to be no more than the granulating tissue will tolerate.

The rules here given are not hard and fast ones that will apply to all cases, as we know there will be exceptions in which we can exceed the limit allowed, and other cases where we will find it a little too liberal. But in practically all cases, where motility is the only factor to be considered, it will be found a most useful aid in making a diagnosis.

111 W. MONUMENT ST.

## The Effect of Scorbutic Diets upon the Teeth.

By PERCY R. HOWE, A.B., D.D.S., Boston, Mass.

ASST. PROF. DENTAL RESEARCH, HARVARD UNIVERSITY; CHIEF OF RESEARCH LABORATORY,  
FORSYTH DENTAL INFIRMARY FOR CHILDREN.

**T**HE effect of scorbutic diets upon the teeth and their adjacent structure is very pronounced. This has been noted by all students of the subject of vitamine deficiency. It is possible to

period in animals. The teeth will become elongated, irregular and very loose. The gums will be red and spongy. Extensive absorption of the alveolus takes place. The hair of these animals loses

FIG. 1.



The lower incisors of guinea-pig loosened by nutritional disturbance.

FIG. 2.



Lateral movement by a delicate instrument.

FIG. 3.



Shows depth of pocket in tissue.

FIG. 4.



Posterior and anterior movement.

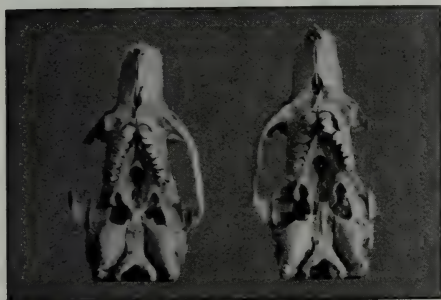
produce extensive dental effects by continuing such a diet for a considerable

its luster. The joints become sensitive and slightly swollen. They are rheu-

matic. The dental effect more closely simulates pyorrhea than does any such condition that has been artificially produced in animals. A profound metabolic disturbance has been brought about. It might be conjectured that a condition

lowed by a certain amount of improvement.

FIG. 5.



A B

A, Control. B, Shows alveolar absorption, most marked from second molar to second molar.

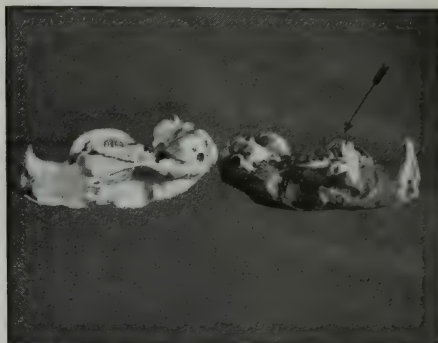
FIG. 6.



A closer view of alveolar absorption.

has occurred in which nature has sacrificed the comparatively non-essential or temporary bony structure about the teeth in an effort to maintain the alkalinity of the blood, or a disturbance in calcium metabolism may have occurred. This is a matter for future study. It is to be noted that the animals are constipated and that the correction of this is fol-

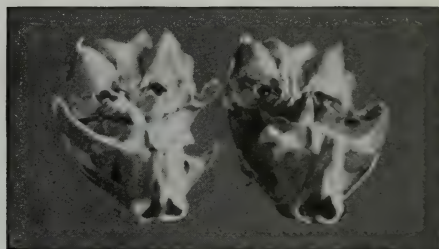
FIG. 7.



A B

A, The Control: The alveolus is close against the teeth. They are short and firm. B, Shrunken alveolus, teeth elongated and very loose.

FIG. 8.



Front view showing length of loosened molars.

FIG. 9.



Control, closer view, teeth regular and firm.

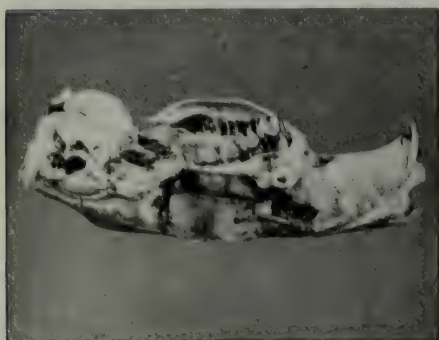
Here is a very good demonstration of the manner in which the normal microbic



life of the mouth acts in disease. Too much attention has been given to the micro-organisms associated with dental diseases. All other factors seem to have

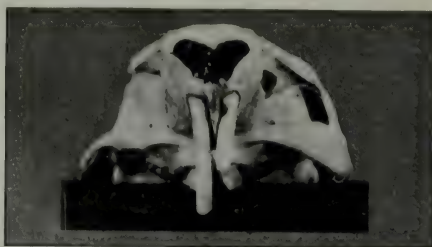
erning factor. The micro-organisms will not cause the disease when injected into the gums. No one has ever succeeded in establishing pyorrhea by the injection

FIG. 10.



Experimental animal, four months. Molars much elongated, loose and irregular.

FIG. 11.



A condition often mentioned in scorbutic animals. Broken incisors. The teeth often became brittle. I am inclined to believe that this is a separate condition from that accompanying looseness.

FIG. 12.

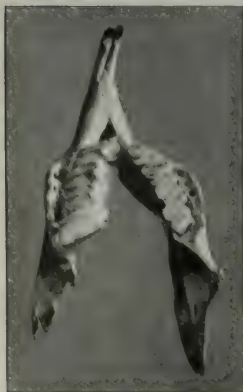


FIG. 13.

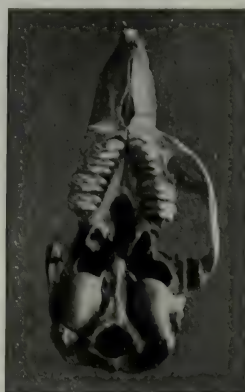


FIG. 14.



FIG. 12: Lower view. Teeth much elongated, very loose, and supporting structures nearly gone.

FIG. 13: Upper jaw—teeth much elongated, loose, alveolar absorption extensive; the teeth driven outward against external alveolar wall.

FIG. 14: Irregularity of articulation produced by looseness of teeth. Inferior teeth being driven in; superior being driven outward. The structure of the teeth was softened and they seemed bent.

been excluded in the interpretation of the actions of this type of micro-organisms. These micro-organisms are present in such a disease as pyorrhea, it is true, but so they are in every normal mouth. It is the tissue condition that is the gov-

into the gums of any micro-organism or group of micro-organisms. If they were the cause of the condition, such an injection would always cause it. Experiments show that they never cause it. They are secondary factors and nothing

else, and just as this type of micro-organism acts in pyorrhea, so it acts elsewhere. Micro-organisms are secondary

all disturb metabolism with pronounced dental effects. Certain kinds of poisons, as phosphorus, mercury, also produce

FIG. 15.



FIG. 16.



FIG. 17.



FIG. 15: Alveolar absorption, elongation. Teeth loose and bent.

FIG. 16: The teeth are noticeably bent.

FIG. 17: Elongated and loose; substance of the teeth altered; alveolar absorption.

FIG. 18.

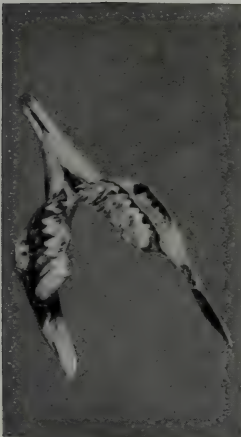


FIG. 19.



FIG. 20.



FIG. 18: Lower jaw; alveolus entirely gone about left lower molar.

FIG. 19: Pockets and alveolar absorption.

FIG. 20: Another lower jaw with extensive absorption. The teeth are very loose: some of them retained only by the soft tissues.

invaders, depending for their parasitic growth upon areas of lowered resistance. Great harm has resulted to dentistry by other teaching.

Diabetes, alcoholism, specific diseases,

metabolic irregularities that loosen the teeth by affecting their supporting structures. Local effects, similar in character, are induced by abnormally biting on the teeth. The natural functions of the con-

neeting tissue and adjacent tissues of the teeth are interfered with.

These effects produced by vitamine-deficient diets may be cured by supplying foods containing vitamins. It is

dentist, and for two years or more I have been urging that others make them the subject of study. A fuller account of this work may be found in the May issue of the *National Dental Journal*.

FIG. 21.

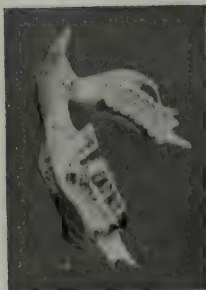


FIG. 21: Irregularity and looseness of teeth.

FIG. 22.



FIG. 22: Absorption and looseness.

FIG. 23.

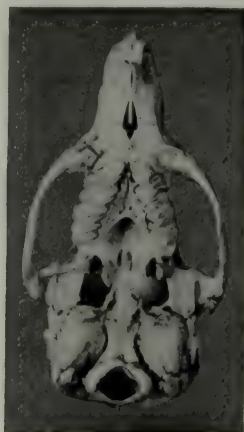
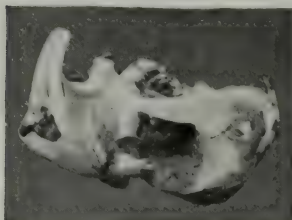


FIG. 23: Elongation and absorption; teeth softened and bent; driven outward.

possible to loosen the teeth of guinea-pigs in three weeks by feeding them as we have described. If the feeding experiments have not extended over too

FIG. 24.



Showing curvature of the teeth.

great a period by adding milk, butterfat, and green vegetables to their diet, the teeth will tighten again and the gums regain their normal appearance. These dental effects are most significant to the

Fig. 11 shows a condition of the teeth often brought about during the feeding upon scorbutic diets. This animal was one of a group that I have fed and am still feeding, in an effort to produce dental caries in animals. There was no looseness of the teeth, but they were dry, brittle and altered in structure through feeding. In this particular set of animals excessive amounts of dextrin were fed. I have carried out experiments in two groups of guinea-pigs of about sixty each. At the present time, I have fifty-four animals that I am studying, which show interesting dental effects. Examination of the pulps of these teeth show that they are affected before grosser indications appear. The prompt effect of diet upon the teeth and their supporting structures is self-evident. The dietary irregularity produced by scorbutic diets is not confined to animals but appears in man and directly affects the teeth.



## Oral Syphilis :

A Consideration of this Subject Especially Intended for Dentists.

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### HISTORY.

THE question of the antiquity of syphilis, as we know the disease since 1492, is a moot one. Whether, as has been claimed, syphilis was unknown to the Europeans prior to the return of Columbus from the New World, or whether the end of the fifteenth and the beginning of the sixteenth centuries marked a pandemic of the disease, which had long existed among the people of Europe, is difficult to decide. The evidence is slightly in favor of the importation into Europe of the disease by the sailors of Columbus who had been infected on their trips to America, probably on the first trip to Hispanola or Haiti. It is interesting in this connection to note that the original Caribs, the Indian inhabitants of the islands of the Caribbean Sea and its mainland boundaries, were characterized by very poor upper central incisors. This character is still marked in the present descendants living in the Antilles.

Certain it is that the armies of Charles VIII carried syphilis into the remotest parts of Europe, and the savants of the period acclaimed it a new disease and presented it with as many names as there were observers. Fracastoro (1484-1553) has the distinction of naming the disease from the swineherd hero of his poem, which was the earliest popular work on the disease.

The first instance on record, according to Josso, of a syphilitic lesion of the mouth dates back to 1560, when Botal observed a syphilitic chancre of the mouth. About the same time, Brassa-

vola called attention to the syphilitic chancres met with in children, which had been given to them by their nurses. From that time on, Ambrose Paré, Fallope, and others all observed the buccal chancre.

According to Bulkley, the earliest recorded cases of transmission of syphilis in dental operations were in connection with the transplantation of teeth during the last quarter of the eighteenth century. "John Hunter (1786), in whose time the operation of transplantation seems to have been extensively performed, was forced to admit the transmission of syphilis in two out of seven cases. He also readily admitted the possibility of such inoculation through other dental operations. J. C. Lettson in the same year reports a number of cases which came to his notice, some of which he pronounced undoubted syphilis due to the same cause." (Quoted from Miller.)

During the century since, and even during the early period of modern dentistry, cases of syphilis acquired in the dental chair have been recorded. Recently I observed a case in a young officer who undoubtedly received an unmerited syphilitic chancre at the site of a tooth extraction during the operation.

### SYPHILIS AND DENTISTS.

It is the duty of dentists to acquaint themselves with the various lesions of syphilis found in the mouth, and lesions which simulate syphilis should be regarded as suspicious. The dentist should observe extra precautions until he has

had the patient consult his or her physician, and received an expert opinion. The reasons for this are almost self-evident, and concern the welfare of the patient, because what his non-technical knowledge considers merely a "cold-sore" may be an early chancre. Immediate treatment before the generalization of the disease makes absolute cure almost certain. Further, the dentist must protect himself against infection and its results to self and family. Thirdly, the dentist must consider his other patients, since the disease may be transmitted through intermediate sources as instruments, cups, etc.

#### PREVALENCE OF SYPHILIS.

Estimates from hospitals, out-patient departments, obstetrical services, etc., have given the prevalence of syphilis in the general population as about ten per cent. Although classed for many centuries as a venereal disease, syphilis may be transmitted by other than sexual practices. Bulkley collected statistics of 9058 extragenital chancres, of which 1810 were on the lips, 734 in the buccal cavity, 307 on the tonsil, 157 of the tongue, 37 of the gums, and 145 of the cheeks; that is, over forty per cent. were in the dental field. More recently (1910) Scheuer collected 24,855 recorded cases of extragenital chancres, of which 5665, or about one-quarter of the whole number, were upon the lips. In 1575 cases the chancre was on the buccal mucous membrane; 1608 on the tonsil; 448 primary lesions of the tongue; and 154 of the gums. There were 2838 recorded chancres of the nose, neck, chin, and forehead. Porter at the Barnard Free Skin and Cancer Hospital reported 24.5 per cent. of 295 patients with chancre presented the initial lesion of syphilis on other than the genital surfaces. Of the 54 patients so affected 31 presented the chancre on the lips, (9 on the upper, and 22 on the lower); 6 on the tongue; 2 on the cheek; 2 at the angle of the mouth, and 1 on the tonsil. Porter also reported from the Washington University Dispensary about 11 per

cent. of the total primary sores located extragenitally; 6 on the lower lip; 1 each on the tonsil, cheek, and tongue.

#### INFECTION OF DENTISTS.

It has been estimated that about 35 per cent. of all the chancres of the finger have been found among dentists. Other dentists have been infected through the habit of holding instruments between the teeth. One dentist is reported to have been infected by scratching himself on the jagged tooth of a patient, and then to have contaminated the wound by the instrument which had been in an infected patient's mouth.

#### THE CAUSE OF SYPHILIS.

In 1905, Fritz Schaudinn (1871-1906), working with Erich Hoffmann, demonstrated under the microscope the causative agent of syphilis, the *Spirochaeta pallida*, or as Schaudinn later named it, the *Treponema pallidum*. This organism satisfies the postulates of Koch, namely, that (1) it is a specific organism always associated with the disease, (2) when isolated in pure culture and (3) inoculated into a healthy susceptible animal produces the disease, and (4) may be obtained again in pure culture.

The method of choice for the diagnostic demonstration of the *S. pallida* is the dark field illumination method. The staining by India ink (Burri) or by Giemsa may be used, but are not so satisfactory. The *S. pallida* observed under the dark field is a motile organism. It is about seven microns long (diameter of a red cell) has an average of eight turns, is exceedingly thin, straight, and has a regularity of spiral that makes it seem possible to run a ramrod through its long cylindrical axis. The motions are (1) a spiral, corkscrew, or "bit" motion; (2) back and forth in the fluid medium so that it remains in the same field for a long time, and (3) a rising and sinking motion, making it essential to focus to keep the same organism under observation. The *S. pallida* maintains the same



form when at rest. Double, triple, or even giant forms may be observed.

Smears from the mouth are contaminated with the *Spirochætæ* macrodenticium, microdenticium, and buccalis. There is no difficulty in distinguishing the coarse macrodenticium with its smaller number of thickly set spirals from the delicate pallida, but the microdenticium and buccalis may give some trouble unless one possesses an intimate knowledge of the behavior of the offending organism. The last named are both as fine as the pallida, but they move differently, have not the same form maintained throughout their course, change character when at rest, and are likely to have one or more spirals uneven in height. A study of the usual spiral flora of the mouth will be well repaid by the wealth of information acquired. Tooth cavities and the spaces between the teeth are the incubators for this type of bacteriological investigation. It will be surprising to most to have revealed an indefinite number of organisms even in the most cleanly kept oral cavity.

#### VULNERABILITY OF THE *S. PALLIDA*.

It is important for the dentist to have some ideas as to the vulnerability of the *S. pallida*. In its natural habitat, the lesions of the body, it is alive and infectious. In the laboratory under special conditions, they may be kept alive indefinitely. If moist, as on a wet towel, Zinsser and Hopkins showed that they were viable after eleven hours, even if exposed to room temperature and sunlight. It has been proved by numerous observers that drying causes the organism to lose its power of motility, and that after drying, infected objects are no longer capable of transmitting the disease. Reasoner has shown that soap has in all probability a lethal effect on the *S. pallida*. Recently I have been experimenting on the action of weak acetic acid, and on the basis of clinical observation and microscopic examination I think that acids have an equal lethal effect. The observations of Metchnikoff,

that the local application of 33 per cent. calomel ointment to the site of inoculation of *S. pallida* prevented the development of the infection, providing the local treatment were made within several hours, are very important. Mercuric chlorid in 1:1000 solution is about equally effective. The practical application of these observations is that the dentist who may accidentally come into intimate contact with infectious syphilitic material should *immediately* wash with plenty of soap and water, and apply a 33 per cent. calomel ointment in lanolin base, rubbing for five minutes.

#### THE WASSERMANN TEST.

In 1906, Wassermann working with Neisser and Bruck brought to the profession a practical blood test for the detection of syphilis. Although this test bears Wassermann's name it was based on previous work of Bordet and Genou on the fixation of complement.

The Wassermann reaction is a delicate test depending on many factors. It is beyond the scope of this writing to describe the test in detail with its many modifications. It is necessary for the dentist to know that a report is reliable only if from a well-controlled laboratory, and that the test should be regarded, so to speak, as one symptom, rather than as the diagnosis. Clinical observation and bacterial investigation should be considered.

A report of four plus positive Wassermann from a reliable and painstaking laboratory undoubtedly means that the patient has or has had active syphilis. The so-called paradoxical four plus or non-specific positive reactions occur in *Frambæsia tropica*, (Yaws) sleeping sickness, and in nodular leprosy, but these diseases are of infrequent occurrence in temperate climes. Slightly positive reactions may occur in tuberculosis, and perhaps in measles and scarlet fever.

The New York City Board of Health advisably states on the back of each report:



# INTERPRETATION OF THE WASSERMANN READINGS.

++++ means very strongly positive; +++ , strongly positive; ++ , positive; + , weakly positive; ± , doubtful; — , negative.

A diagnosis should never be made from a weakly positive or doubtful reaction (+ or ±), but in a case of syphilis that has had specific treatment such a reaction would indicate the necessity of further treatment.

A weakly positive or doubtful reaction (+ or ±), where there is no specific history and where the test is made simply as an aid in diagnosis, is usually considered negative. A negative Wassermann reaction does not absolutely exclude the possibility of syphilitic infection.

In primary syphilis, period of chancre, the Wassermann is negative, although the *S. pallida* may be found in the sore. This is an example of syphilitic infection with negative Wassermann. Later in the primary stage when the lymph nodes that drain the area of the chancre become enlarged, and the spirochetes are probably circulating in the blood, the Wassermann becomes positive. In the stage of generalized eruption, the secondary stage, the Wassermann is regularly positive. In the tertiary stage, perhaps 80 or 90 per cent. of syphilitics give a positive reaction, but a small percentage of undoubted syphilitics never give a positive result even after treatment—the so-called “provocative” reaction. Persons with syphilis of the nervous system may have negative blood Wassermann reactions.

## THE SYPHILITIC INFECTION.

Before proceeding to a consideration of the different phases of syphilis as they concern the dentist, it will be of service to rapidly review the successive phenomena which attend the acquired syphilitic infection.

It is axiomatic that all syphilis follows pre-existing syphilis. The presence of the *S. pallida* is one of the factors in the transmission of the disease. The second factor is that these organisms find a break in the skin or mucous membrane of the new host, since the spiro-

chete will not thrive so readily on the absolutely healthy unbroken skin. The lack of continuity of the epidermis need not be more than microscopic in size, but the *S. pallida* will flourish and infect the individual. A third factor is that the person must be free of syphilis, because a syphilitic cannot be reinfected until he is entirely cured of his old syphilis.

Syphilis can of course be transmitted other than by direct contact. Any instrument that has come in contact with an open lesion or the blood of an active syphilitic may be the means of carrying the infection, unless sterilized by heat, chemicals, or drying. The slight wounds made by the dentists in the most casual instrumental examination of the mouth are ideal for the well-being of the spirochete because of the moisture and warmth of the oral cavity. The possibility of infection at the time of tooth extraction, because of the condition of the insulted gum, should not be minimized.

About ten to forty days after the successful implantation of *S. pallida* on fertile soil, the first lesion of syphilis or the chancre appears at the site of inoculation. This period without symptoms is known as the primary incubation time and is on the average about three weeks. During these three weeks the original wound of entry may have entirely healed, but the spirochetes below the surface have multiplied and invaded the neighboring lymph channels. This is proved by the fact that surgical removal of the chancre does not prevent later manifestations of the disease. It is important to remember that the Wassermann is negative during the first incubation period and during the early period of the chancre. The early period of expression of the syphilitic infection is, however, the time when the disease may be most successfully attacked, and clinical skill and the microscope should be used to make the diagnosis.

The period next advanced from the primary syphilis is the silent generalization period. The chancre is present, there are clinically no secondary skin or

mucous membrane lesions, yet the Wassermann is strongly positive. The spirochetes are free in the blood at this period but no metastatic foci have had time to manifest themselves.

The secondary stage of syphilis or the stage of generalization with symptoms is the next period in the disease. The spirochetes are lodged in end capillaries everywhere in the body, and excite a varied reaction according to the susceptibility of the individual and the character of the tissue. On the mucous membrane of the mouth the mucous patch is of importance, because it is teeming with the exciting organisms and is rife with infectious possibilities. The lymph glands throughout the body are enlarged; the skin may present polymorphous lesions; the hair may fall out and papules in the flexor surfaces become hypertrophic—so-called condylomata lata. The Wassermann is always positive in secondary syphilis. About 25 per cent. of secondary syphilitics give evidence of nervous system involvement clinically or by laboratory tests.

The lesions of the secondary period may regress with or without treatment, and the patient is in the stage of potentially active syphilis. Generalized eruptions may recur, or isolated lesions manifest themselves as gummata of the skin, bone, brain, or other viscera. The Wassermann remains persistently positive or becomes negative for short periods only. The gumma forms when a localized focus of spirochetes becomes active because of some injury to the part, or other reasons which are as yet obscure. In the mouth gumma of the hard palate ulcerates and forms perforations. During this period symptoms of the nervous invasion of the spirochetes may be made evident clinically as paresis or locomotor ataxia.

Syphilis is one of the diseases which are transmitted intra-utero to the offspring. When the syphilitic marries, having had no treatment or inadequate treatment, although he presents no lesions, he more than likely infects his wife. She may never become pregnant, or she may conceive but the pregnan-

cies are frustrated by early miscarriages; birth of dead children; living children that show all the evidence of syphilitic infection except the chancre; and then she may give birth to children that do not show any lesions until twelve to twenty years of age. The chronology is not as regular as given since living, apparently healthy children may be born between two undoubtedly syphilitic miscarriages; but it does seem as if there is some attenuation as far as the results on the newly born are concerned. Of course, all the open lesions and discharges, especially the early ones, on the congenital syphilitic are infectious. It is generally held that the infection may be carried to the third generation. Many problems of congenital syphilis still remain to be solved, and are not touched on here. It may be mentioned that syphilis is not hereditary in the sense that the disease is transmitted as one of the characters of the chromosome system. The term congenital syphilis is more fitting to the process, and less committal to a mechanism which is not fully understood.

#### MOUTH LESIONS.

The lesions of syphilis about the mouth are outlined briefly as they touch on the dentist's work. It may be well to quote that master of medicine who has recently passed from among us, Osler, "Know syphilis in all its manifestations and relations, and all other things clinical will be added unto you."

#### PRIMARY ORAL SYPHILIS.

The chancre in and about the mouth may be acquired by kissing, use of infected cups, instruments, and abnormal sexual practices. It is generally agreed that a break in the continuity of the skin or mucous membrane is essential, but it is also maintained that the active, pointed spirochete may penetrate unbroken surfaces. It is not unusual to have the chancre follow a simple lesion of the lip like a "cold-sore" if the patient has come in contact with infectious material. The chancre may be a single lesion, or it may be multiple. Usually



the chancre is painless. There are several types of chancre classically described, but the special conditions of moisture and warmth about the oral cavity tend to modify these types. Secondary infection by the mouth organisms may also give an atypical appearance to the chancre. It should be remembered that the primary lesions of syphilis which have not had any antiseptics, especially mercurials, applied, will be found rich in *S. pallida*.

Chancre of the lip is the most common of all extragenital chancres. The lower lip is most often affected. If the lesion is in the median line it may appear double. The inner surface is less affected than the outer. I have seen no record of the primary lesion at the vermilion border.

The chancre of the gum is the rarest of the oral chancres. The danger of transmitting syphilitic infection at the time of tooth extraction should be considered possible, however. Chancre at the base of the tooth may follow manipulations, such as scraping, in which the gum may be injured by an infected instrument.

The tip, dorsum and sides of the tongue are the usual sites for chancre of this organ. A natural fissure may be infected. Many chancres of the tongue are atypical, erosive in character, but some assume the same characters as chancre of the skin.

The tonsil may be the focus for the growth of spirochetes. It has been assumed by some that all chancres of the tonsil may be the result of unnatural practices. This is not the case, however. I have seen at least one chancre following an incision of a peritonsillar abscess with an unsterilized instrument. It is not so far-fetched either to consider that the tonsil may become the site of chancre for spirochetes planted on some other portion of the oral mucous membrane. Chancre of the tonsil may simulate non-specific diseases as Vincent's angina, tonsillitis, etc. One should be cautious regarding the identification of the mouth spiral organisms when examining for *S. pallida*.

#### ADENITIS OF CHANCRE.

About two weeks after the first appearance of the primary lesion the satellite glands become enlarged. For chancre of the median line of the lip, the submental group is affected, and usually the submaxillary. Bilateral submaxillary enlargement may follow chancre to either side of the median line with more enlargement to the affected side. Chancre of the lower gum is followed by sublingual and submaxillary enlargement. Primary lesion of the upper gum usually causes enlargement of the deep chain of glands probably behind the pharynx. Tongue chancres excite reaction of the sublingual and submaxillary groups. The draining glands of the tonsil are those at the angle of the jaw.

The method of gland puncture for the demonstration of the *S. pallida* has been advocated, since the puzzling presence of other spirochetes will thus be avoided. I have not had the success reported by others using this method.

#### SECONDARY ORAL SYPHILIS.

It is important to remember that the mucous membrane lesions of the disease appear prior to the generalized skin lesions of the secondary stage of the disease, because of the vascularity and character of the mucous membrane. This accounts also for the Koplic spots appearing in early measles a little before the rash of this exanthem.

Early in the clinical observation of syphilis it was not generally believed that secondary manifestations of the disease in the mouth were part of the infection. Treatises are existent claiming, for example, that all such lesions were due to the mercury used therapeutically. (In those days they gave mercury until it produced salivation.) Other gentlemen of the same early period thought that the mucous membrane lesions were not infectious. We know better now.

A generalized erythema or a mottling of the mucous membranes may be the



first sign of the generalization of syphilis. Mucous patches are present in about half the cases of secondary syphilis. They may appear on the tonsil, cheek, lips, palate, and less frequently on the gums. The mucous patch is a flat lesion, rather whitish in the center with a narrow rim of erythema about it. The mucous patch may become hypertrophic and assume the character of condylomata lata. At the angle of the mouth the mucous patch becomes the split papule, because of the repeated trauma of opening the mouth. This is a most persistent lesion and is always infectious. It should not be confused with the disease known as "perlèche," which simulates it closely, and which is streptococcal in origin.

Recurrent and persistent secondary lesions of the mouth are of frequent occurrence in the untreated or under-treated patient. As long as the *S. pallida* is present such lesions are infectious no matter how old the infection may be.

#### DANGER OF THE MUCOUS PATCH.

Fournier has made a summary of the dangers of the mucous patch, which I quote in full from MacKee's American Edition p. 499:

*Dangers of the Mucous Patch.* We may say approximately that out of ten syphilitic contaminations one is derived from the chancre against nine from the mucous patch. And how can it be otherwise?

1. The chancre has only a limited existence of a few weeks.
2. The chancre occurs only once in the whole course of the disease and is not reproduced.
3. The chancre with its induration, ulceration, and satellite bubo, is more observable than the mucous patch, and consequently more attention is paid to it.

While on the other hand:

1. The mucous patch is essentially liable to recurrence, even ten or twenty times.
2. The mucous patch is a lesion with multiple localizations, which may affect the mouth

more often than the genitals, but many people believe that syphilis, as a venereal disease, is confined to the genital organs; and many thinking that contagion is only transmitted by coitus expose themselves to the risk of contagion by the mouth.

3. The mucous patch is a lesion which may occur several years after infection, even ten years after the chancre, at a time when the disease is believed to have ceased to be contagious.
4. Lastly, the mucous patch is especially dangerous by the excessive benignity which it often assumes, when it consists simply of a simple erosion. Many patients, deceived by such appearances, expose themselves to transmit contagion.

Here are a number of excellent reasons to explain why the mucous patch causes an indefinitely greater number of contagions than does the chancre.

For example, the contaminations of wet nurses is almost invariably due to a mucous patch in the mouth of the suckling. Again, the infection of married women is almost always caused by a mucous patch in the husband.

Of all the lesions of syphilis, it is the mucous patch from which the greatest number of contagions are acquired. . . .

#### LEUKOPLAKIA.

There is a lesion of the mouth which is generally ascribed to syphilis, the so-called leukoplakia. It is a white, diffuse, somewhat raised lesion, usually on the buccal surface of the cheek, but found also on the tongue. It has been compared to the normal white patches found in the black mouths of dogs. Smoking was formerly believed to be the activating cause, syphilis the predisposing cause of these lesions. Many writers now doubt both assertions. In all probability these patches are not infectious and their importance lies in the fact that they become the site of malignant degeneration.

#### TERTIARY ORAL SYPHILIS.

Tertiary syphilis lesions contains few *S. pallida*, hence these lesions are potentially infectious. There are, however, few recorded cases. The fissures of the

tongue often found in syphilitics are tertiary manifestations. There are, it should be remembered, many non-syphilitic causes of fissuring of the tongue. The textbook gumma lesion of tumor, ulceration, and punched out character of the resulting ulcer is seldom found in the mouth. Secondary infection usually causes gumma lesions of the mouth to simulate the lesions of new growth or tuberculosis. It should always be borne in mind that both these last-named lesions may appear in a syphilitic.

Gumma of the hard palate protrudes into the oral cavity. Breaking down of this gumma usually results in perforation, because of the necrosis of the bone.

It has been my experience that such perforations occur much sooner in the course of the syphilitic infection in people of the southern countries. I have seen many South Americans in New York City who showed such perforations as early as the seventh month of their syphilis. In Haiti I saw at least a hundred such perforations in the syphilis ward of a hospital. Ordinary treatment is of no avail in restoring lost tissue, and the operative measures devised are not universally successful.

#### CONGENITAL SYPHILIS.

The dentist will not be likely to meet the early and infectious lesions of the new-born syphilitic. They approximate very closely the lesions of the second stage of the acquired disease. He may be consulted, however, because of the dystrophies which are common in the congenital syphilitic, both in the deciduous and the permanent teeth.

Observations on the dental stigmata of the congenital syphilitic are recorded as early as 1576. The work of Hutchinson (1856) is universally known, and the contributions to the subject by Fournier are generally recognized.

The following conclusions from Cavallo, "Syphilis in its Relation to Dentition," are quoted in full as his researches and studies have not been surpassed:

I. In hereditary syphilitic subjects the following dental stigmata are found: Erosions of the crown, cuspal erosion, and Hutchinson's tooth, white sulci, white marks; delay of development and eruption; dental infantilism, microdontism; amorphism, persistence of the deciduous teeth; anomalies of structure, shape, number, direction, arrangement, and color; vulnerability of the dental system; ectopia, total or partial absence of teeth; wearing away, premature caries, premature loss of teeth, space between teeth, diastema, and the following maxillary stigmata: malocclusion, defective articulation of the dental arches, prognathism, and cleft palate.

II. The dental stigmata are the most frequent, characteristic, persistent, and indelible among the stigmata of hereditary syphilis.

III. The erosions are systematic; they occupy the same level on homologous teeth, and a different one on teeth of a different order. Besides, they have a marked predilection for some teeth (Hutchinson's erosion in the upper centrals, horizontal grooves in the lower incisors, cuspal atrophy in the canines and first molars).

IV. The dental stigmata do not belong exclusively to the second, but are also frequently found in the first dentition. Some cases of dental stigmata in the third generation have been recorded.

V. The cup-shaped or honeycomb erosion on the deciduous molars, especially on the second, is very frequent, and we have generally found it in our observations.

VI. The dental alterations as found in idiots, backward children, etc., represent a type quite different from those found in hereditary syphilitic subjects. Hutchinson's tooth, the systematic lesions, the horizontal grooves, dental infantilism, and cup-shaped erosion in the deciduous molars are peculiar to hereditary syphilitics, while in idiots the vertical grooves and megalodontism are noted.

VII. The dental stigmata are rarely found alone (we have observed only three out of fifty-six cases); they are generally associated with other stigmata of the head or with other general concomitant stigmata.

VIII. A relationship between the factors of Hutchinson's triad, especially between the dental and the ocular lesions, is very frequently found.

In fifty-six cases of dental lesions we have found ocular lesions thirty-five times, and auricular lesions twelve times.

IX. The anatomical and pathological examination of the dental follicles and of syph-



ilitic teeth furnishes us with the following characteristic symptoms: Constrictions which clinically correspond to the cuspal atrophies; alterations of the enamel and dentin; interprismatic spaces, interglobular spaces, rounded islands, granulations due to an inhibitory disturbance which acted upon the tissues during the period of development.

X. In the dental follicles of macerated and doubtless syphilitic fetuses, the following alterations have been found: Endovasculitis, perivasculitis, hemorrhage, and parvicellular infiltration.

XI. The *Spirochæta pallida* is abundantly found in the dental follicles near the so-called dental cap, in proximity to the vessels and in their walls.

XII. The dental stigmata depend upon a general morbid cause, which manifests its inhibitory action during the period of development of the tooth, *i.e.*, the second half of the intra-uterine life and the first months of extra-uterine life. Such a morbid general cause can only be syphilis.

XIII. The presence of vascular alteration and of *Spirochæta pallida* in the dental tissues leads us to believe that dental stigmata are of syphilitic nature and not only of indirect syphilitic origin.

XIV. The dental stigmata are of great importance for the diagnosis of hereditary syphilis, indicating the disease even before the appearance of other stigmata.

*Hutchinson's teeth, the cuspal atrophy of the first permanent molar, the multiple systemic lesions of the second dentition, the multiple and systemic lesions of the first dentition, especially the cup-shaped erosions of the molars, are pathognomonic of hereditary syphilis.* In twenty-three out of fifty-six cases, Hutchinson's teeth have been found.

XV. The maxillary alterations, although rather frequently found in hereditary syphilitic subjects, do not possess an absolute diagnostic value.

XVI. The specific treatment is always to be suggested in hereditary syphilitic children with dental stigmata, even if these stigmata are found alone and unassociated with other syphilitic or dystrophic stigmata.

#### PROPHYLAXIS.

There should be no question but that the doctor and dentist work together on the question of syphilis, which is a danger and menace to all. It is no

breach of professional ethics to inform a fellow practitioner, as dentists and doctors are, of the disease in a patient under the care of both. If either discovers or suspects the infection, the duty of both is plain.

I have mentioned above that the dentist finding a definite or suspicious lesion in one of his clients should advise immediate consultation with the family physician. The dentist for his own protection should carry out the chemical prophylactic measures advised, washing with plenty of soap and water, and the application of a mercurial. Any instrument which may have directly or indirectly come in contact with the patient should be sterilized. I would advise the dentist to delay treatment of such a case until assured by the physician that the patient was no longer infectious.

If called upon to put a syphilitic patient's mouth into good condition in order that he may better tolerate mercury in the cure of the disease, the dentist should request the physician to render lesions non-infectious by preliminary doses of arsphenamin (salvarsan), or its modifications. A dentist who is doing much of this work may be justified in using a separate chair and set of instruments for these patients. The use of gloves, either with or without first covering the hands with a mercurial ointment, is an extra precaution recommended.

The dentist should sterilize his instruments after use in every instance. Patients are keen to recognize the careful dentist in this regard, and to remember proper technique to his advantage. A sterilizer should be a fixture in every dental office, but one that is utilized.

Hasseltine in his excellent paper recommends the following methods for the sterilization of dental instruments:

1. That all instruments and appliances be rendered mechanically clean by washing (with soap) in water with a brush or sponge.

2. That the following instruments and appliances be boiled or submitted to 80°C. in a slightly alkaline solution (0.25 per cent. sodium hydroxid):



Artificial teeth used in matching and measuring.  
 Broaches.  
 Burnishers.  
 Burs.  
 Chip blowers.  
 Chisels.  
 Drills.  
 Excavators.  
 Explorers.  
 Files.  
 Forceps, extracting.  
 Forceps, foil.  
 Handpieces of engine.  
 Impression trays.  
 Knives and lancets.  
 Mallets, hand and automatic.  
 Mixing slabs.  
 Mouth gags.  
 Mouthpieces of saliva ejector.

Pliers.  
 Pluggers.  
 Pyorrhea instruments.  
 Polishing points and brushes (if not discarded after using once).  
 Reamers.  
 Root elevators.  
 Rubber-dam clamps, and forceps for same.  
 Rubber-dam weights, and metal parts of holder.  
 Saws.  
 Scalers.  
 Scissors.  
 Scratch wheels on head of engine.  
 Spatulas, metal.  
 Syringes, hypodermic.  
 Syringes, water.  
 Tongue-holding forceps.  
 Mirror (if 80° bath to be used but not to be boiled).

3. That instruments in the above list, whose mechanical construction makes it difficult to remove excess of water, are to be placed in 95 per cent. alcohol for ten minutes to remove water, then removed and allowed to dry.

4. That only instruments with metal handles be used by dentists desiring to follow this method.

5. That the following instruments be sterilized by immersion in a 5 per cent. solution of phenol for at least sixty minutes: Mounted stones; tortoise-shell instruments; mirrors (when 80° bath is not used); other instruments not of metallic nature, and which cannot be replaced by metallic instruments.

6. That instruments after using be placed in a fluid medium, preferably clear water, to avoid drying of infectious material, and to facilitate their mechanical cleansing.

7. That no instrument or appliance used on a patient directly or indirectly be used on any other patient until recommendations 1 and 2, or 1 and 5, as the case may be, have been complied with.

Among other sanitary measures, Haseltine mentions the use of the fountain cuspidor; a sterile sleeve which can be slipped over the cable of the power-transmitting mechanism; use of foot levers for wash basins, etc.; a clean washable covering for the operating chair; and a clean cover for the headrest, renewed for each patient. The patient should brush his teeth immediately prior to coming to the chair, the dentist giving him a brush. Paper cups and towels should be used.

#### TREATMENT OF SYPHILIS.

Soon after the recognition of syphilis in Europe, mercury was used as a therapeutic agent. Inunction was the favorite method of use, but oral administration and, later, hypodermic injections were used. As I mentioned earlier, mercury was given to the point of tolerance, and its toxic effects were confused with the symptoms of the disease. Mercury is still used in the treatment of syphilis.

Potassium iodid was first recommended in the treatment of syphilis about 1834 by Wallace. "Jobling and Peterson have recently explained the action of iodids, as follows: The softening and removal of caseous necrotic material from a gumma is due to tryptic ferment. The gumma, however, persists and remains firm because it contains large quantities of antitryptic substances which are of lipoid nature, being combinations of unsaturated fatty acids. Their power of antagonizing the ferment depends upon their unsaturation, which in turn can, as is well known, be satisfied by iodin, this forming the basis of the well-known index used in estimating unsaturated fatty acids. Administration of iodin by saturating the antitryptic substances destroys their power over the tryptic ferments, which then dissolve the caseous material." (Quoted from MacCallum, "Text-Book of Pathology," p. 650.)

In 1910, Paul Ehrlich (1854-1916) distributed to the heads of various syphilis clinics about the world, samples of a synthetic arsenic preparation for the treatment of syphilis. Salvarsan was the result of "606" experiments to produce a drug which has the greatest poisonous action on the cause of syphilis, and is, at the same time, almost harmless to the living tissue of the patient. Within a short time the results of the use of this drug in every possible manifestation of syphilis proved that a specific had been found. Although Ehrlich's idea that one dose of salvarsan would sterilize the patient, *therapia sterilisans magna*, has not been sustained, the drug is today our standby in the treatment of syphilis. Ehrlich did not stop with "606" but proceeded with experiments until "914," or neosalvarsan had been produced. Just prior to his death, Ehrlich produced a newer drug called "natrium salvarsan" which combined the good features of both "606" and "914." Since the war, delivery of German-made salvarsan was uncertain, and "606" has been manufactured in many other countries. In the United States, the generic term arsphenamin has been chosen to represent the chemical compound of "old-salvarsan;" the term neo-arsphenamin was given to the product "neo-salvarsan" or "914."

There is agreement among syphilographers that the most effective time for producing radical results with arsphenamin is during the early period of the disease, and before the generalization which is expressed by the positive Wassermann, even before the appearance of the secondary eruption. The doses of arsphenamin administered intravenously vary according to the age of the patient, and the character of the manifestation. The ordinary doses vary from four to six decigrams. The maximum dose, six decigrams, should be given only to vigorous individuals, who are known to be tolerant to the drug. The doses of neo-arsphenamin are one-half greater than for arsphenamin. The maximum dose for this compound is nine decigrams. Different physicians use various formulæ

in estimating dosage and the frequency of injection.

#### MEDICO-LEGAL ASPECTS.

The liability for the communication of diseases to a patient during dental operations is thus given by Noyes:

It is the duty of the practitioner while treating his patient, to use reasonable care and to employ reasonable skill not to communicate infectious or contagious diseases to the patient. This rule applies not only to the communication of a disease from which the practitioner himself is suffering, but also to the communication by the practitioner from one patient to another. If a dentist knowing he has such a disease allows the patient to visit him without appraising the patient of the danger and without taking proper precautions on his own part, and communicates the disease to the patient, he is liable to the patient for any damage the latter suffers thereby.

Not only is he liable for damages resulting from thus communicating a disease from which he suffers, but he is also liable if he negligently transmits a disease from one patient to another, as when having treated one patient known to him to have an infectious or contagious disease he proceeds to treat another patient without warning such patient, and without taking proper precautions against the communication of the disease.

The same rule applies whether the transmission of the disease was effected through the medium of the practitioner himself, or by the use of infected instruments.

#### SUMMARY.

Syphilis is frequently expressed by lesions about the oral cavity. These lesions of the different stages of the disease are protean in character, that is, take various forms. The dentist should be observant of the oral cavity of each client, in order to avoid infection, and to avoid carrying the infection to other patients.

Bacterial investigation of suspicious lesions about the mouth are especially interesting because of the necessity of differentiating the non-pathogenic spiral organisms which are normally present and which simulate the *Spirochaeta pallida*, the causative agent of syphilis.



The syphilitic lesions of the mouth are part of the general infection. The lesions here are pathologically the same as elsewhere in the body, modified by the special conditions of heat and moisture of the oral cavity and the presence of other bacteria.

The mucous patch, one of the most dangerous and persistent lesions of the disease, is present in about fifty per cent. of all secondary syphilitics.

The perforations of the hard palate, due to ulcerations of gumma of the part, are frequently found in late syphilitics. This destruction is not remedied by anti-syphilitic treatment.

The congenital syphilitic presents many lesions of the mouth. The stigmata and dystrophies of the teeth are of especial interest. They are frequent, permanent, characteristic, and diagnostic of the condition.

The dentist should observe rigid asepsis. He should take all reasonable precautions, and use more than ordinary methods of sterilization of instruments and hands during his examinations and operative procedures.

In all certain or suspicious cases, the patient should be advised to apply to his family physician, and the dentist should delay his work, if possible, until assured that the patient is non-infectious.

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15 CENTRAL PARK, WEST.

## A Practicable Root-canal Technique.

### VII: Obliteration of the Canal.

By ARTHUR B. CRANE, D.D.S., Washington, D. C.

(Continued from page 452.)

**P**ROVIDED the root canal has been properly prepared to a conical form the filling operation is not one of great difficulty, but the question as to the limitation of the filling has created considerable discussion.

While the theory of blood-borne infection of the periapical region may be discredited, it is doubtful if it can ever be disproved. It follows then that no matter how sterile the tissues may be rendered, the filling of the canal must be absolute in order to preclude the possibility of reinfection. It is preferable in order to emphasize this point to speak of obliterating, rather than filling, the canal. Such an operation must take into account the dentinal tubuli and accessory foramina. There is no such thing as a "pretty good" filling, for unless the filling hermetically seals the canal, spaces will exist in which bacteria may propagate.

Let no one delude himself with the idea that he can fill any part of the canal or tubuli which has not been previously depleted of its organic content. It is in this matter of necessity that the great value of the use of sodium-potassium is manifest. If the dentin has been soaked with an oil readily miscible with chloroform an additional advantage will have been obtained.

A number of substances have been suggested for filling the dentinal tubuli, of which Callahan's solution of resin in chloroform and Howe's silver-reduction solutions have had the widest acceptance. It has been demonstrated beyond

dispute that these substances will completely penetrate the dentin. In view of the well-known facts that the stain from a copper-amalgam filling or a base-metal crown post will do the same thing, it is strange that such a property required demonstration, but penetration and obliteration are entirely different propositions.

There is a hard-pressed filter paper used to filter barium salts. The porosities of this paper are about one-tenth the diameter of the dentinal tubuli. If a piece of this paper is fitted into a funnel and resin varnish poured through it, there is no appreciable inhibition to the passage of watery dyes even after it has dried. Furthermore, even in the event that it did seal the tubuli it would offer no barrier to micro-organisms, as may be readily demonstrated by the following experiment:

A number of glass rods, so bent at one end that they may be hung up, are dipped into a solution of *Bacillus prodigiosus* and hung up to dry. They are then dipped somewhat deeper into chloro-resin varnish and allowed to dry again. Petri dishes are now inoculated with the varnished end of different rods about every fifteen or twenty minutes up to two hours. One rod is used unvarnished as a control. After culture it will be observed by the uniform amount of the red color produced on the medium that the resin varnish has had no effect whatever in sealing in the organisms with which the rods were coated. If these two experiments are convincing, no depend-

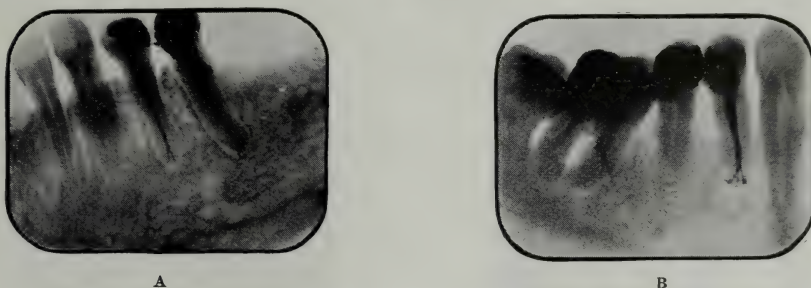
ence can be placed in the chloro-resin as a filling material.

As to Howe's silver reduction method of filling the tubules, we need only to perform the reduction in a test tube to realize what occurs in the tooth. When the solutions are mixed the walls of the tube become mirrored with silver, but upon looking into the tube it will be seen to contain an excess of watery solution containing a flocculent precipitate of metallic silver, and this is exactly what would exist in any tube no matter how small. Substances flow into the dentinal tubuli only by capillary attrac-

as possible with sterile cotton points, a drop of chloro-resin is introduced from the flamed beaks of the cotton pliers and pumped into the canal with a smooth broach. A gutta-percha point considerably smaller than the canal is now pushed into it and agitated in such a manner that it is dissolved, thus forming chloro-percha within the canal. This is the method suggested by Callahan and leaves nothing to be desired.

The bulk of the filling may be made of undissolved gutta-percha. This is not an absolutely ideal material for root-canal filling, but has more points in its

FIG. 1.



A, B, Multiple canal endings, filled by technique herein described.

tion, and this physical force is exerted upon liquids.

Until some more convincing evidence is presented for these or some other substances for filling the tubuli, it would seem wise to place dependence in soaking the dentin with a mild antiseptic oil as offering more defense against reinfection than is possible by any other present means.

In order to obliterate the accessory foramina and inequalities of the canal it is necessary that part of the filling material should be introduced in liquid form. Chloro-percha of proper consistency not only will flow into such accessory foramina and inequalities as have been opened, but possibly into the orifices of the tubuli as well (Fig. 1). The addition of resin to the chloroform makes the chloro-percha more adhesive and it may be used for this purpose.

After the canal has been made as dry

favor than any other material proposed for this purpose. When properly introduced and condensed it serves the clinical requirements.

The most satisfactory form for routine use is the so-called "points" or, more properly speaking, cones. Those prepared by the Mynol Company are comparatively uniform and free from inequalities. They are also flattened on the end, which makes them easier to grasp in the cotton pliers.

#### EFFECT OF OVERFILLING THE CANAL.

Since the necessity for completely filling all canals has become an accepted policy, the desire of conscientious men to surely accomplish this end has led in many instances to grotesque overfilling, which at best serves no useful purpose (Fig. 2). Granted that in many cases this causes no particular damage other than a temporary trauma, nevertheless



in lower molars and bicuspid a peri-apical projection of gutta-percha may

FIG. 2.



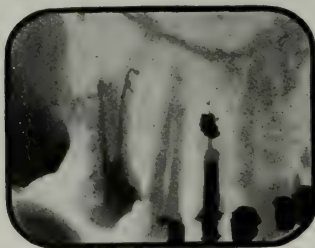
Grotesque overfilling.

impinge on the mandibular nerve, and in upper bicuspid and molars a piece of

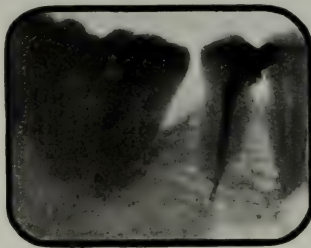
apical opening depends upon the extent to which the apical cementum has been denuded of its life-giving membrane (Fig. 4). In a very few cases of Class I and in all cases in which there is as yet no periapical disturbance the line of the pericementum as disclosed by the radiograph is practically continuous. In such teeth to be ideal the filling should stop at the apical extremity of the canal (Fig. 5A and Fig. 10).

A careful examination of the apical termination of the canal in a number of extracted teeth will reveal the fact that in a goodly proportion there exists a crater-like depression in the cementum at this point. This should be considered an integral part of the canal in so far

FIG. 3.



A



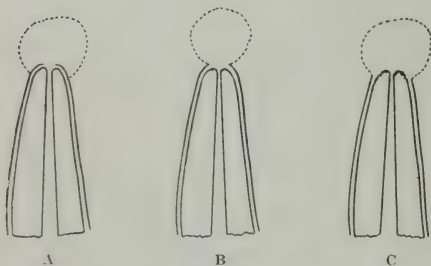
B

A, Gutta-percha point, probably projected into antrum; B, gutta-percha point impinging on inferior dental nerve, causing sensory paralysis of lower lip.

gutta-percha extending into the antrum would surely invite reinfection (Fig. 3).

as the filling operation is concerned, except in cases of recent operative devitalization. The radiographic evidence of the

FIG. 4.



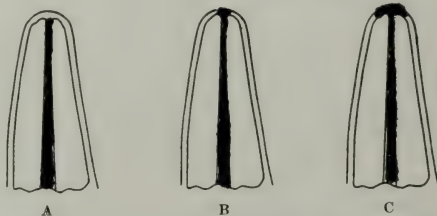
A

B

C

A, Crater at apex should be filled; B, apex should be capped; C, too much dead cementum to be capped.

FIG. 5.



A

B

C

A, Filled to the end; B, crater filled; C, apex capped.

The amount of filling material, if any, which should be forced through the

filling of this crater would indicate a little ball at the root apex (Fig. 5B and Fig. 11).

In no case is it necessary or even desirable to project a solid gutta-percha point beyond the root end, but wherever denuded apical cementum exists the attempt should be made to cover this with a cap-like film of chloro-percha (Fig. 5c). A careful study of the radiograph will indicate the amount of filling material which will be of value beyond the canal proper, and by different methods of inserting the filling about to be explained this amount can be controlled to a reasonable degree.

#### TECHNIQUE OF FILLING THE CANAL.

The method of filling just to the end is as follows: In preparing the canal for this purpose the apical foramen should not be enlarged. The canal is flooded with chloro-resin varnish and a very fine cone introduced and passed toward, but not quite to, the root end. This is dissolved with a stirring, not a pumping motion, which will coat the canal walls with a sticky chloro-percha. A somewhat larger cone is now selected, but not so large as to impinge on the canal walls in its passage to the apex. This is dipped in chloro-resin and slowly insinuated into the canal almost to the end. At this stage time must be allowed for the chloroform to dissipate before proceeding with the operation. Part of the chloroform will evaporate and part will combine with the gutta-percha of the cone. As this process progresses the chloro-percha becomes thicker and the gutta-percha cone becomes softer until at last the whole mass in the apical end of the canal will be homogeneous. When the gutta-percha in the pulp chamber is about the consistence of unvulcanized rubber a blunt plugger, too large to go far into the canal, is slightly warmed and used to gently pack the filling material toward the apex. At the first suggestion of pain the packing should cease. A fine plugger which will freely pass into the canal is now warmed and carefully passed through the center of the mass until it enters the apical third of the canal. It is then moved about in such a manner that the filling

material is packed against the side walls of the canal, after which the deficiency thus caused is filled with a suitable cone packed to place. This procedure should be repeated until the canal is full.

If the radiograph shows the filling to be incomplete, this can be corrected at a subsequent sitting by placing a drop of chloroform in the pulp chamber and passing a root pick through the filling toward the apex until pain is experienced. The opening thus made is then filled with a suitable gutta-percha point first dipped in chloroform.

To prevent overfilling the following points should be observed:

1. Do not enlarge the apical opening.
2. Use a stirring motion in making the chloro-percha.
3. Insert the cone in such a manner as not to force the chloro-percha ahead of it.
4. Patiently wait for the whole mass in the apical end of the canal to become homogeneous before beginning to pack.
5. Discontinue packing toward the apex at the first indication of pain. Thereafter pack against the side walls only.

#### TECHNIQUE OF CAPPING A DENUDED APEX.

In order to cap a denuded root apex, and this is necessary in most cases of periapical disease, the apical foramen should be somewhat enlarged. Too much zeal in this direction, however, will result in a persistent seepage into the canal, which is most difficult to control.

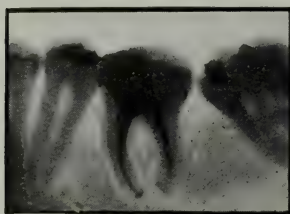
The capping of a denuded apex is usually much easier than filling just to the end, and the amount of filling material extruded can be controlled to a reasonable degree (Fig. 6).

Depending upon the amount of capping desired, the canal should be lined or even filled with chloro-percha in the manner previously described, only now the cone should be dissolved by a pumping motion, as many cones and as much chloro-resin being used as may be necessary to furnish a suitable amount. A little experience will soon equip the

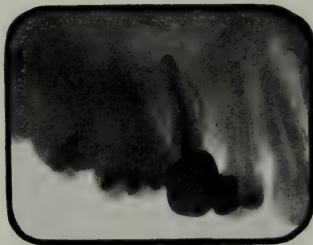
operator to judge this with a fair degree of accuracy. A cone which approximately fits the canal is then selected and dipped in chloro-resin, and gently pumped through the chloro-percha to the end of the canal. During these pumping operations there will often be slight twinges of pain, but these are caused by the irritation of the chloroform and should be disregarded. When the cone finally seems to have reached

ance. In other words, it will fill the space where tissue is missing. It is possible that the natural elasticity of the granulation tissue will have a tendency to force this gummy mass back toward the denuded cementum, thus increasing the intimacy of its attachment. This may be further assisted by making pressure on the crown of the tooth with the finger, or better by allowing the patient to bite hard with the tooth on an ordi-

FIG. 6.



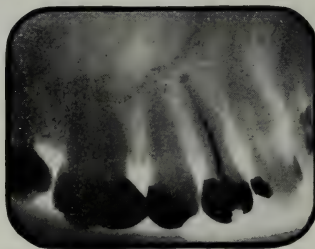
A



B



C



D

Apex capped. Correct technique only in cases attended with exposed apical cementum.

the end of the canal, time must be allowed as before for the chloroform to diffuse, but it is not necessary to wait quite so long as when the filling is to be confined to the canal. Usually when the blunt end of the cone begins to be plastic the point will not be solid enough to penetrate tissue. If pressure is then brought to bear, the mass in the apical end of the canal will flow through the apical opening at such a consistence as to distend the granulation tissue and flow in the direction of the least resist-

nary lead-pencil eraser. The well-known tendency of chloro-percha to shrink upon the evaporation of the chloroform will result in a properly placed capping hugging the root apex tighter than ever.

The amount of filling material passed through the apical opening may be controlled as follows:

1. The degree to which the apical opening is enlarged.
2. The amount of chloro-percha formed in the canal.
3. The gradation of the pumping



motions, both in making the chloro-percha and inserting the filling.

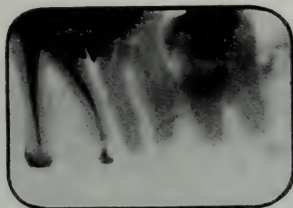
4. The accuracy of the fit of the gutta-percha cone.

5. The consistence of the mass in the apical end of the canal when pressure is brought to bear.

If pressure is exerted too soon, the liquid chloro-percha will be forced into

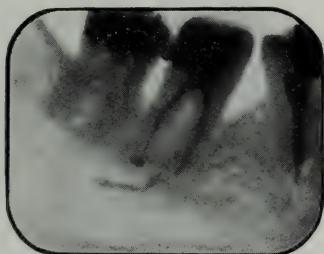
When the root apex is capped the packing of the filling against the side walls of the canal should be done as previously described, and then the whole mass forcibly packed with a warm plugger, too large to go far into the canal. If pain is exhibited during the packing more time should be allowed, as this is an indication that the gutta-percha cap is still soft enough to flow. A few teeth thus capped have been extracted several months after the insertion of the fillings. In these cases the cap was very adherent to the cementum and about as hard as gutta-percha becomes in coronal cavities.

FIG. 7.



Filling in mesial root caps a large denuded area of apical cementum. Filling in distal root projected by too precipitate pressure forcing the chloro-percha ahead by its piston-like action.

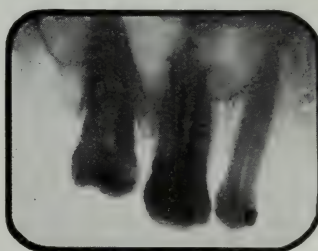
FIG. 8.



Runaway chloro-percha resulting from pressure on cone while chloro-percha was too fluid. Note beautiful result in distal root, in which the chloro-percha became gummy.

the meshes of the granulation tissue by the piston-like action of the cone (Figs. 7 and 8); or the point of the cone may be so solid as to penetrate the tissue (Fig. 9). Only when the filling material is gummy may it be confined between the granulation tissue and the cementum. By careful study of the foregoing features it will be possible in most instances to confine the extruded filling material to the immediate utility of capping the root apex.

FIG. 9.



Solid gutta-percha point penetrating the tissue. (Disto-buccal root.)

#### DEVITALIZING UNINFECTED TEETH.

Before leaving the subject of the treatment of root canals to consider the surgical treatment of periapical disease, it may be wise to consider the subject of devitalization of uninfected teeth.

For many years the dental profession ignorantly destroyed normal pulps in order to make bridge abutments more secure. The disclosures of the dental radiograph of periapical conditions which supervened gave such a shock to the profession that the conscientious dentist now looks with fear and trembling upon the necessity for such an operation. Yet until some more satisfactory abutment for vital teeth is devised, the demand of an educated public for removable bridge work will continue to make devitalization necessary. In view of the holocaust wrought by this agency in the past, how may it now be undertaken with

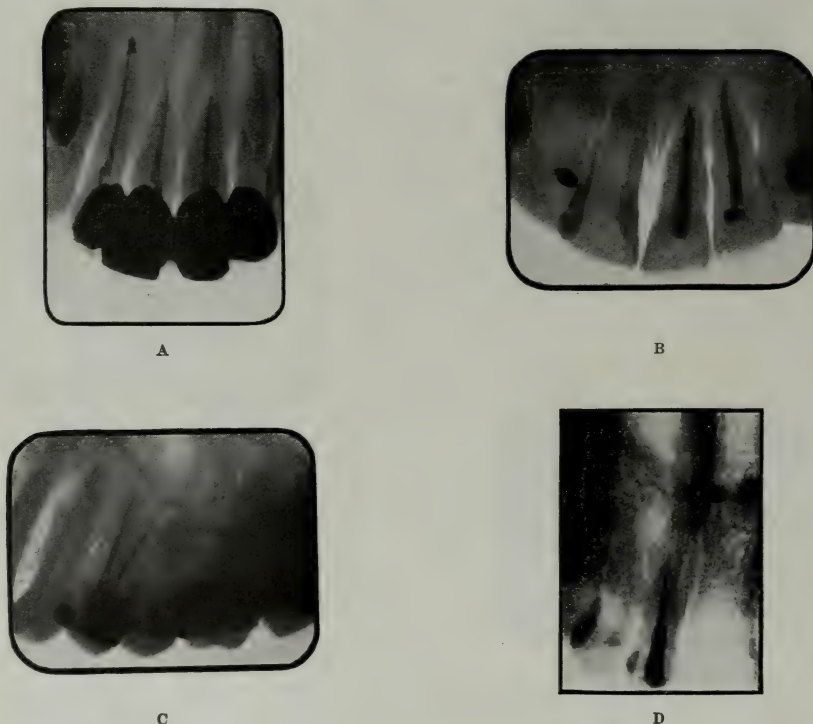
safety? The crux of the whole matter lies in asepsis. Provided the pulp may be extirpated and the canal obliterated without introducing infection no untoward result should follow. *Teeth are not a source of danger because they are pulpless but because they are infected.* With the most painstaking technique a tooth once infected may be rendered safe, but the aseptic devitalization and filling

should be delayed until a mild antiseptic dressing has been sealed in contact with the pulp for a couple of days.

#### TECHNIQUE OF DEVITALIZATION.

With the strictest aseptic technique the pulp chamber is uncovered and all débris cleaned away with alcohol. A fine, smooth broach is used to explore

FIG. 10.



Canals filled to the end. Correct technique only in recently devitalized teeth.

of non-infected teeth offers the greater sense of security.

As in any surgical operation of choice, the prime consideration is the selection of cases in which conditions will not forestal a happy termination. Teeth with deep-seated decay or pyorrhea or those in close proximity to periapical areas of infection should be avoided. Preference should be given to teeth with unbroken enamel covering. The extirpation of pulps accidentally exposed in operating

the canal. The pulp is extirpated with a fine Donaldson pulp-canal cleanser. This should be insinuated in the path made by the smooth broach until it appears to have reached the apex. It is then withdrawn just a trifle to avoid the possibility of binding and twisted around slowly a couple of times. The sense of touch will be more acute if no broach holder is used. When the broach is withdrawn the pulp will usually be found twisted about it. If only part of it comes

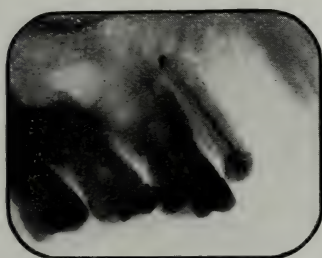
away the remainder will be removed during the enlarging and shaping of the canal by the technique previously described.

Repeated washings with hydrogen-peroxid, using the sterile cotton points or cotton wrapped broaches as swabs, will remove all the blood and débris and leave the canal walls clean. An apex curet is then used to clean the extreme

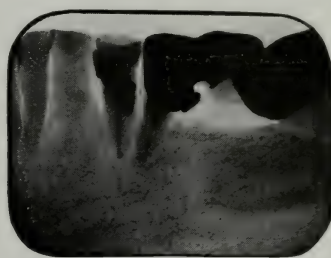
of overfilling, which in such cases is entirely undesirable. Indeed, it is less dangerous to fall slightly short of the apical extremity than to have the filling protrude into the periapical tissues (Fig. 10).

For the extirpation of vital pulps slow subperiosteal injections of cocain immediately over the root apex will generally be satisfactory, but in bicuspsids and

FIG. 11.



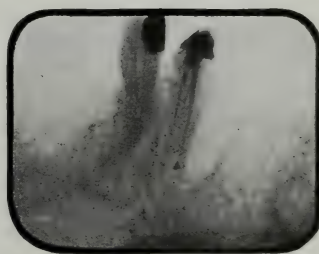
A



B



C



D

Crater filled. Correct technique only in cases of pulp decomposition, attended with no periapical disturbance.

end of the canal, but no instrument must pass through into the periapical tissues. The canal is again washed with hydrogen-peroxid and dried as thoroughly as possible with cotton points.

A strand of picture wire, wrapped with cotton fibers and placed in apinol prior to the operation, is now passed into the canal and sealed there with gutta-percha rendered sterile in the flame. A radiograph is made and studied as a guide to the length of the root.

No attempt should be made to fill the canal while anesthesia persists for fear

of overfilling, which in such cases is entirely undesirable. Indeed, it is less dangerous to fall slightly short of the apical extremity than to have the filling protrude into the periapical tissues (Fig. 10).

For the extirpation of vital pulps slow subperiosteal injections of cocain immediately over the root apex will generally be satisfactory, but in bicuspsids and

molars it is often well to support this with conduction anesthesia. Pressure anesthesia is responsible for much of the infection which has followed extirpation, because the possibilities of contamination are infinite. It is wiser to avoid it entirely, but if employed some of the anesthetics which will stand boiling should be used and base-plate gutta-percha softened in the flame should be substituted for red vulcanite rubber as a plunger.

921 15TH ST., N. W.

(To be continued.)



## Mercuric Cyanid in the Treatment of Vincent's Infection, or So-called "Trench Mouth."

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THE terms Vincent's angina, ulceromembranous angina, chancreiform angina, diphtheroid angina, ulcerative gingivo-stomatitis, gangrenous stomatitis, ulceromembranous stomatitis and many others have been applied to an infection of the oral cavity conceded to be caused by the so-called Vincent organisms.

As the area of infection may be extended from time to time, or even from day to day, the writer suggests the term *Vincent's infection*, which should be sufficiently descriptive of the type of lesion dealt with, instead of the various terms describing the subdivisions as suggested by Barker and Miller. All of these oral lesions come under the classification of Barrett and Smith, *viz.*, "spirochetal pyorrhea," and are acute cases of Vincent's infection.

With the ordinary methods of treatment a spirochetal infection is extremely resistant, and as a rule can only be eliminated by means of a specific or some powerful escharotic, the latter at the same time destroying the delicate soft tissues. Experience with this particular type of pyorrhea before the war, while associated with Barrett, assisted me greatly in the treatment of the more violent types in the army known as "Trench Mouth."

It does not seem that this infection of the mouth is quite so fully understood and recognized, and its seriousness appreciated as it should be, and as a result many cases are overlooked in their incipency when, if measures were instituted to abort this condition, a fu-

ture destruction of tissue could be avoided. It is thought to be one of the most infectious and contagious diseases of the oral cavity and pharynx, and is more prevalent, especially at the present time, than is generally supposed and occurs in the mouths of children as well as of adults, regardless of sex. The war in addition to many other evils has helped to disseminate this infection to such an extent that the civilian population is confronted with a most destructive disease. The increase in this condition since demobilization has been very marked, and measures on the part of the health authorities should be taken to check its course.

It is conceded by most observers that the Vincent spirochetes and the fusiform bacilli are the organisms directly responsible for this disease. Whether or not they are two separate and distinct organisms has not been proved to the entire satisfaction of all; hence for the present, at least, we must assume a symbiotic relationship, or that they are two forms in the life cycle of the same organism.

Thus far inoculations into the lower animals have been wholly unsuccessful in reproducing the disease and so not only is the question of identity of the two organisms still undecided, but also as Koch's postulates have not been fulfilled we lack the crucial demonstration that these organisms are the exact cause of the conditions here described.

This much, however, is to be noted, that they are present locally in enormous number in all the conditions here described and that with the disappearance of these organisms the conditions undergo healing. (*Bowman.*)

## RELATIONSHIP OF THE FUSO-SPIRILLARY ORGANISMS.

That the fusiform bacilli and spirilla are different forms of one organism is the opinion of Seiffert, Perthes, Herrmann, Neuf, Krahn and Greeley. Tunnickliff in 1911 reached the following conclusions: "The strains of fusiform bacilli isolated in pure culture from the normal mouth in ulcero-membranous angina, gingivitis and noma appear culturally and morphologically to be the same organism. The cultures show that the bacilli and the spirilla are different forms of one organism."

Other observers do not share in the above views, particularly Ellerman, who calls attention to the lack of motility of the cultured organisms.

Pure cultures of fusiform bacilli have been obtained by Veillon, Zuber, Ellerman, Weaver and Tunnickliff.

Noguchi, in the *Journal of Experimental Medicine* (No. 16, 1912), states that "most authorities mention the presence of *Spirochaeta buccalis*, *Treponema macrodentium*, *Treponema microdentium*, fusiform bacilli, and occasionally a spirillum allied to that of Vincent." He further states that he obtained in pure culture from a case of pyorrhea alveolaris a mucin-producing spirochete for which he proposed the name "*Treponema mucosum*."

## HISTORY.

The fusiform bacilli and spirochetes, named for Vincent, were first seen and described by Miller in 1882, and in 1884 were associated with tonsillar lesions by Babes.

According to Tarassiewicz (quoted by Mayer) the first observer to note the association of fusiform bacilli and spirilla with a morbid process was Rauchfus in 1893, who demonstrated pointed bacilli and spirilla in ulcero-membranous angina.

Plaut in 1894 described the organisms in five cases of ulcerous angina, and Vincent in 1896 described fusiform bacilli and large spirilla in cases of hospital gangrene. Matzenauer reported a like finding.

In 1897 Bernheim reported thirty cases of stomatitis and angina, in all of which he found fusiform bacilli and spirilla, and appears to have been the first to point out the etiological identity of certain cases of stomatitis and angina.

Vincent in 1898 reported a further series of cases of ulcero-membranous angina in which the organisms were present.

These two organisms have been found in cases of noma by Matzenauer, Seiffert, Perthes, Rosenberger and others.

In 1909 Ghon and Mucha reported two cases of brain abscesses in which they found these organisms, and in 1910 Kaspar and Kern reported two cases of pyemia in which fusiform bacilli were found.

Peters in 1911 found fusiform bacilli in a case of lung abscess, in a case of fetid bronchitis and in a case of hand infection, the last caused by the teeth of another person. Silberschmidt reports finding these organisms in fetid bronchitis.

In 1911 Heyde found fusiform bacilli in eight out of one hundred and two cases of appendicitis. Veillon and Zuber found them also in certain cases of appendicitis.

In 1912 Rosenow and Tunnickliff claimed to have isolated the fusiform bacilli in pure cultures from various lesions in a case of pyemia.

Bernheim and Popischell found these organisms in gangrenous laryngitis, and Freejmath and Petruschky, Seiner and others in noma, while Wolbach found them in certain chronic ulcers of the legs in Gambia.

Swelling and ulceration in glands of the neck and elsewhere and all kinds of other septicemic complications, from bronchitis, albuminuria, pericarditis and iritis, to congestions in various serous membranes, and even pneumonia, are examples of different types of septicemic complications of Vincent's angina which have passed through the hands of Tixier and Tobe. In many instances the complications so outshadowed the trench mouth that the connection with the latter had not been suspected.



## ACQUIREMENT.

This disease can be acquired by salivary contact, such as kissing, the use of eating utensils, cups and glasses, which have not been properly cleansed, the exchange of pipes, cigars, cigarettes, the use of wind instruments, lung testing machines at dime shows, pens, pencils, toothpicks, money, megaphones, telephones, improperly sterilized dental instruments and hands, toothbrushes lying on shelves in contact with other brushes so contaminated, etc.

## CLINICAL ASPECT.

It is difficult to give a word picture of Vincent's infection as it occurs in the mouth, since the cases present themselves at various stages in the progress of the disease.

In the fairly advanced cases we find the gums swollen and congested and at times the entire gingival margin, lingually, labially and buccally, has undergone ulceration and sloughing. Other ulcers may appear on the lips, tongue, mucous membrane of the cheek, over the lower third molars, in the roof of the mouth, in the soft palate or tonsils, and floor of the mouth. Barker and Miller report a perforating ulcer of the hard palate resembling tertiary syphilis.

The typical Vincent ulcer presents a well-defined margin, and has a punched-out appearance, sometimes superficial, sometimes deep. It has a yellowish-white necrotic covering which when removed leaves a bleeding, highly sensitive surface. It is conceded that the Vincent ulceration resembles so closely lesions of like type in diphtheria and syphilis, that a differential diagnosis cannot always be made without the aid of a microscope.

The breath is usually fetid and there is some fever, with malaise, considerable pain, sleeplessness, depression, loss of appetite, thirst, salivation, irritability and often headaches, nausea, swelling of the glands of the neck, difficult and painful deglutition, increased cardiac and respiratory action, prostration, toxemia and septicemia.

One characteristic of the disease is the

permanent destruction of the interdental gingival tissue which seems to be the first to slough away. Following a case of Vincent's infection, the peridental tissues are fertile soil for a future case of pyorrhea, as it is most difficult to keep the food and other foreign material from packing in the V-shaped spaces left between the teeth. It naturally follows that if we have such impaction with resulting inflammation, it leaves the tissues more susceptible to infection.

Coincident with the oral condition we usually find associated a tonsillar and lymphatic involvement. Campbell and Dyas state that in advanced cases the tonsils may be almost eaten away, and a similar condition with reference to the genitals has been described by Corbus.

The tissue overlying the lower third molar in cases of delayed or faulty eruption is probably the most frequent site of infection. Taylor and McKinstry state in their report on the relation of peridental gingivitis to Vincent's angina: "An investigation of the histories of the cases showed the same sequence of events in them all, namely, that the gums were always infected first and that the sore-throat was the more recent condition, having been infected it would seem from the gums."

When many of these cases present themselves for treatment, the patients give a history of having been unable to use a toothbrush for some time because of the extreme soreness and profuse bleeding resulting from its use; hence we must take into consideration this fact and not conclude that the disease has resulted from neglect of oral hygiene, although it may be a contributing factor.

## AGENTS RECOMMENDED.

Williger recommends peroxid of hydrogen (official) and an eight per cent. solution of chlorid of zinc, while Kummel recommends lactic acid (fifty per cent.) iodoform paste to be rubbed over the involved areas. Chaufford seems to have first proposed the use of methylene-blue for this purpose.

Other agents mentioned as being of



value in the treatment of this malady are gentian violet, formalin, chlorate of potash, the arsenical preparations, such as salvarsan, neosalvarsan and arsenobenzol, sulfuric acid, chromic acid, tincture of benzoin, sodium perborate, dichloramin-T, silver nitrate, iodine, trichloroacetic acid, nitric acid and possibly many more.

#### TREATMENT.

While in the "A. E. F." it came to my lot to treat many of the so-called "Trench Mouth" cases which were nothing more or less than cases of Vincent's infection and I placed dependence on salvarsan and neosalvarsan with gratifying results; but the disease did not respond quickly enough and while apparently specific for the spirochetes, yet at a certain stage of the treatment another germicide had to be depended upon.

In the cases of acute Vincent's infection every day means more destruction of tissue and the interdental gingival tissue is cut down with scythe-like precision and with great rapidity. There are possibly many germicidal agents which would alleviate this condition if given sufficient time, but the necessity for quick action is apparent to all who have had any experience with this disease and its manifestations.

Learning through Dr. J. L. Wozniack, a genito-urinary specialist attached to our hospital, that mercuric cyanid was being used hypodermically to combat syphilis, in addition to the routine salvarsan and mercury, I thought perhaps it might be efficacious in cases of trench mouth and I decided to give it a trial. It seemed that if mercuric cyanid was effective against the *Spirochæta pallida* it would also destroy the Vincent spirochetes and possibly also the fusiform bacilli if applied directly to the lesions. After using it a short time I was convinced in my own mind that mercuric cyanid was as nearly the ideal agent as could be expected or desired in eliminating this dreaded malady, and with no apparent action on the oral tissues.

After returning to civil practice I

undertook to give the drug a thorough trial, conducting most of my experiments at the Evans Institute, and the men who followed up these cases with me with one accord pronounced the results most gratifying. This substance seems to perform its work with almost mathematical accuracy and one knows in advance what the results will be following its daily application. The lesions are eliminated with amazing rapidity and as yet a case has not presented itself which has resisted treatment in any way.

After the diagnosis has been made from both a clinical and a microscopic standpoint, a one per cent. solution of peroxid of hydrogen, or dilute solution of Lavis, or physiologic salt solution should be employed, under a rather high air pressure to spray all pockets, gingival troughs, and ulcerating surfaces, care being taken not to produce bleeding by too powerful a spray. I rather prefer the peroxid spray, but it seems to make little difference, as the cases treated with the salt solution or Lavis seem to respond as quickly. After the use of one of the aforesaid sprays, the mouth should be sprayed or rinsed with plain water to remove any of the peroxid or Lavis which might remain. The liquids used in the spray bottles should be heated slightly above body temperature, as the compressed air cools the solution before it comes in contact with the tissues, causing pain when sensitive teeth are present.

The patients are plainly instructed not to swallow any of the material to be used and after an understanding has been reached, we proceed to block off the teeth with long thin cotton rolls placed around the vestibule of the mouth, preferably one jaw at a time. The gums and ulcers are then dried with a warm air spray. By means of a cotton applicator, saturated with a one per cent. solution of mercuric cyanid, the drug is applied to the ulcerations gently, being sure that it is deposited on all affected tissue, labially, lingually and buccally. Allow the mercuric cyanid to remain on the gingivæ for about a minute and then remove the cotton rolls and request the patient to expectorate, whether you sus-

pect some of the mercuric cyanid has flowed into the mouth or not. Should the patient desire to expectorate before the expiration of that time he should be permitted to do so.

After the disappearance of these ulcerating surfaces we must then confine our attention to the pockets and gingival troughs and by means of a dull, slightly flattened flexible iridio-platinum needle attached to a glass syringe (Luer type) carefully trace the pockets, depositing a drop or two in each. This takes care of the infection which exists in these spaces, long after we consider our case cured from a clinical standpoint. It is a comparatively easy matter to clear up the ulcerating surfaces, but it requires painstaking treatment to remove completely the infection lurking in the gingival troughs or pockets.

Before each treatment the regular routine use of the spray bottles as outlined should be followed; a half spray bottle full of the peroxid, Lavioris or salt solution is the minimum amount that should be used, the severity of the case determining the quantity to be used. *Not more than two mils of a one per cent. solution of mercuric cyanid should be used at any one treatment.*

After the conclusion of each treatment the patient should remain in the chair for an extra five minutes with instructions not to swallow during that time, but to expectorate whenever necessary. The increase in the amount of saliva is due to the salivation which accompanies this disease, as well as to the stimulating action of the metallic taste of the mercuric cyanid on the salivary glands. Furthermore, the mouth is not to be rinsed after the application of the mercuric cyanid, as a more prolonged effect of the drug is thereby obtained.

The cases should be seen twice a day for at least two days and then once a day until cured. It is not necessary to make a stained smear of these cases each day. When the case has cleared up from a clinical standpoint, we may then make a smear and check up the results. I purposely have omitted mentioning the length of time it takes to clear up these

cases, as this depends entirely upon the factors associated with the disease, such as the elimination of irritating crowns, erupting molars, overhanging fillings, cavities, etc. Cases not complicated by such conditions clear up after a few days' treatment, but when associated with an old chronic case of pyorrhea we must extend our treatments longer, to make sure of the total eradication of these unicellular enemies.

Not alone does mercuric cyanid eliminate the typical Vincent organisms from the mouth, but it also eliminates all other forms and in certain cases a few spherical organisms were the sole survivors. The typical light pink color of normal gingival tissue is in a very short time restored.

#### INSTRUMENTATION.

While we all have the keenest regard for the periodontist who sets a high standard of efficiency in the performance of the intricate, difficult, painstaking and inglorious task of scaling and polishing teeth, *i.e.*, ridding the teeth of all foreign material, yet does it not seem better practice, as suggested by Barrett and Smith, at least to reduce the infection present before plunging our instruments into these infectious pockets, thereby forcing the organisms and their products deeper into the already distended vessels and lymph channels and making the ultimate clearing up of the case more difficult? It requires but a few treatments as a rule to reduce materially the number of these spirochetes and the associated organisms, and then careful instrumentation may be begun, as much or as little as is necessary at one time to suit the case in hand. If this is done carefully and at the proper time, little if any bleeding should occur.

It is a mistake in the case of Vincent's infection, where a great amount of tissue is in the process of sloughing, to begin scaling immediately, as in these extreme cases the gums bleed profusely even if touched lightly; in fact, I have observed a case of continuous visible capillary hemorrhage, the patient having blood in the mouth at all times. Instrumentation is absolutely contra-indicated until the infection has been controlled



and then it must be done very carefully, starting with the most accessible deposits and gradually working to the depth of the pocket if one exists. This instrumentation must be done as thoroughly and carefully as in the cleaning of pyorrhetic teeth before the patient is dismissed as cured.

All irritating factors must also be removed, such as defective operative and prosthetic procedures, also all carious teeth must be taken care of and the tissues surrounding lower third molars brought to a healthy state or such teeth removed. It must be borne in mind, however, that no surgical operation in the mouth is to be attempted or any exodontia performed during the active stage of this infective process. Such work should be delayed if possible until the soft tissues are brought to a healthy state.

#### POST-OPERATIVE TREATMENT.

These cases should be seen at frequent intervals following the course of the treatment, when microscopic examinations should be made to determine whether or not the organisms have been completely eliminated.

The interdental gingival tissue in many of these cases is permanently destroyed; therefore the patient must be instructed to clean the teeth thoroughly after each meal, as it is most difficult to keep the newly-formed spaces clear of debris. The maintenance of a clean and healthy mouth depends not alone on the work of the dentist, but on a scrupulous, intelligent and vigorous mouth toilet.

When there is tonsillar or other involvement it is well to co-operate with the physician or specialist.

#### PYORRHEA ALVEOLARIS.

In contrast to Vincent's infection, we have heard and read a great deal regarding pyorrhea alveolaris.

During the past month the writer has treated some few cases of pyorrhea using the one per cent. mercuric cyanid solution in addition to the sprays and with most gratifying success, even equaling the results obtained in the treatment of the Vincent cases; hence I feel that our

knowledge of the drug has been enhanced by this additional finding, as pyorrhea is certainly a more universal disease.

#### CHEMISTRY.

Mercuric cyanid should be kept in well-stoppered, dark amber-colored bottles.

It occurs as colorless, or white, prismatic crystals, odorless, and having a bitter, metallic taste (the salt is exceedingly poisonous) becoming dark-colored on exposure to light.

Prochorow gave from 25 to 35 drops of a one per cent. solution hypodermically without causing local irritation, and with great asserted benefit, in chronic syphilis.

Dose, internally from one-sixteenth to one-eighth of a grain (0.004–0.008 Gm.). (*U. S. Dispensatory*, 20th Edition.)

The percentage of acidity of mercuric cyanid has been found by Dr. H. C. Campbell to be .065 of one per cent.; in other words, it has just a slight trace of acidity. This was calculated by a tenth normal sodium hydroxid, and the percentage was calculated on the basis of hydrocyanic acid.

Although mercuric cyanid in the one per cent. solution produces a slight coagulation of albumin, yet as it has been used by Meding and many others in ophthalmology without any deleterious effects, its use in the mouth is certainly not contra-indicated. It apparently has no action on normal tissue.

Grandeclément uses a solution of cyanid of mercury, 1:2000 for disinfecting in all operations on the eye. He bathes the eye with it several times a day for three days before the operation and has never had a case of suppuration since adopting this method. Moreover, he claims that this solution is a very effective remedy for chronic iritis and iridochoroiditis, and particularly for atrophic chorioretinitis. (*Journal of the American Med. Association*, Sept. 21, 1912.)

The writer has been unable to detect any action on metallic fillings or on crown and bridge work in the mouth.

#### TOXICOLOGY.

Gettler and Baker report a case of poisoning by mercuric cyanid with recovery. A young lady swallowed a tablet containing  $7\frac{1}{2}$  grains (0.5 gm.) with suicidal intent. Their conclusions are as follows:



The toxic action of mercuric chlorid on the kidney is due to the positive Hg ion, while potassium cyanid exerts its extreme rapid lethal properties (acute respiratory death) through its negative CN ion.

Mercuric cyanid  $\text{Hg}(\text{CN})_2$  contains both of these and *a priori* one would expect it to have the combined effect of the two. However, its toxic action resembles that of the chlorid and not that of the cyanid salt as indicated by the clinical course of this case which resembles strongly that of poisoning with mercuric chlorid with the possible notable exception of a single convulsion on the second day. This action of mercuric cyanid may be due either to its small degree of ionization or to the isometric structure  $\text{Hg}(\text{NC})_2$  which has been ascribed to it by some authors.

The bowels were kept open and small doses of magnesium sulfate were given in water at frequent intervals.

Another case in which the drug was taken with suicidal intent has been reported by Marsh and Marsh, in the *Pennsylvania Medical Journal*. The case was that of a man who took two tablets of  $7\frac{1}{2}$  grains each, with recovery in ten days.

Fifteen grains of sulfid of calcium, dissolved in fifteen ounces of distilled water and carefully filtered, was introduced into the cir-

culation. Five grains of sulfid of calcium were given by the mouth every two hours for twenty hours and then every three hours for several days more. At the end of twenty-four hours a second intravenous injection of seven grains of sulfid of calcium in seven ounces of water was given. The symptoms all subsided and the patient made a quick recovery.

This treatment was suggested by Dr. Wilms of the B. Merrill Ricketts Experimental Surgical Research Laboratory.

The symptoms exhibited in the first case were salivation, drowsiness, stupidity, vomiting, looseness of bowels, retention of urine, convulsions, breath fetid, tongue swollen, and gums ulcerated. In the second case the outstanding feature was the violent vomiting, accompanied by bloody mucous stools and abdominal cramps, also cramps in the muscles of the arms and legs.

With a view to determining the relative toxicity of mercuric cyanid when administered by way of mouth, Dr. H. F. Smyth, instructor in Hygiene and Bacteriology, School of Hygiene, University of Pennsylvania, kindly consented to perform these tests for me and his report in detail is as follows:

RECORD OF TESTS ON TOXICITY OF MERCURIC CYANID.

Date.	Guinea-pig No.	Weight in Grms.	Dose in Mgs. Per 100 Grms. Body Weight.	Result.
1920.				
Mar. 19	1	360	.01	Death in 24 hrs. from pleurisy. Not the result of the cyanid.
	2	610	.1	No apparent effect.
	3	480	1.	No apparent effect.
Mar. 20	4	490	1.	Death in 4 days. Emaciation and paralysis of hind legs preceding death.
	5	635	2.	Partial paralysis of hind legs. No loss of weight in 9 days.
	6	555	3.	Partial paralysis of hind legs. Loss 65 grms. in 9 days.
Mar. 22	7	430	1.8	Death in 24 hrs. Paralysis of hind legs preceding.
	8	645	8.	Death in $1\frac{1}{2}$ hrs., preceded by convulsions and paralysis.
Mar. 23	9	440	4.	Death in less than 24 hrs. Paralysis of hind legs preceding death.
	10	695	6.	Death in 48 hrs. Paralysis of hind legs preceding death. Part of dose regurgitated.
	11	480	4.	Death in 2 hrs. Paralysis of hind legs preceding death.

The guinea-pigs were given the mercuric cyanid in aqueous solution through a stomach tube attached to a Hitchen syringe, the dose being washed down with water. For doses up to one mg. per 100 grms. a one per cent. solution was used; for larger doses a five per cent. solution.

Post-mortems on pigs dying from cyanid poisoning showed congestion of lungs and gastric mucosa usually with hemorrhagic patches in lungs and petechial ecchymosies under gastric mucosa.

Pigs dying within two hours showed evident respiratory distress with shallow respirations, and relaxation of anal sphincter.

These tests give the following results:

- 1-3 mgs. per 100 grms. body weight is usually toxic but may or may not be fatal.
- 4 mgs. per 100 grms. body weight kills in 2 to 24 hours.
- 8 mgs. per 100 grms. body weight kills in under 2 hours with convulsions.
- 1 mg. per 100 grms. is equivalent to 0.75 grms. per 150 lbs.
- 3 mgs. per 100 grms. is equivalent to 2.25 grms. per 150 lbs.
- 4 mgs. per 100 grms. is equivalent to 3 grms. per 150 lbs.
- 8 mgs. per 100 grms. is equivalent to 6 grms. per 150 lbs.

A second series of tests has been conducted in the same manner, using six additional guinea-pigs and giving doses of from 1 to 3 mgs. per 100 grms. body weight. These tests confirm the results of the first series, two pigs receiving 2 mgs. per 100 grms. and two receiving 3 mgs. per 100 grms. dying in from 1½ to 36 hrs., while two pigs receiving 1 mg. per 100 grms. both are alive after 48 hrs.

The smallest dose of Hg(CN)<sub>2</sub> proving fatal to a guinea-pig was 1 mg. per 100 grms. equivalent to about 75 mils of a one per cent. solution for a 150 lb. person, and the 15 grain dose reported above was equivalent to almost 100 mils of a one per cent. solution, while the greatest amount injected into a patient's mouth at any one time is 2 mils of a one per cent. solution.

Preliminary tests made to determine the "phenol coefficient of Hg(CN)<sub>2</sub> show that a dilution of 1:4160 kills *B. typhosus* in five minutes at 20°C.

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## Diseases of the Dental Pulp.

### IV. Treatment.

(Continued.)

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By HERMANN PRINZ, M.D., D.D.S., Philadelphia, Pa.

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(Continued from Vol. Ixi, page 723.)

#### 8. Secondary Pulpitis.

Secondary pulpitis may be defined as being a secondary inflammation of the unexposed pulp as a sequence of local or general diseases. It may be caused by a primary existing local disturbance within the region of the affected tooth or by a general disease. In the majority of cases the causative agent is an infection, although general diseases of a non-infectious type, such as leukemia, locomotor ataxia, chlorosis or increased intra-dental blood pressure, etc., may be the exciting factors. Clinically, secondary pulpitis may manifest itself as any one of the known types of pulpitis, *i.e.*, its course may run from an obstructive hyperemia to necrosis or degeneration of the pulp.

The clinical picture of secondary pulpitis depends principally upon the underlying disease and as a consequence it varies accordingly very widely indeed. If the primary disturbance of the pulp is of a purely local character, the resulting secondary pulpitis may present itself as any one of the numerous modifications of pulp disturbances, and its early recognition should offer no difficulties. If on the other hand the underlying cause is a general disease, the clinical picture becomes much diffused. The patient complains of pain, which he usually designates as being of a continuous dull character. He is not able to locate the respective tooth but merely points to the affected side of the face. Such disturbances usually manifest themselves as the early stages of ob-

structive hyperemia and they are recognized from a description of the existing pain. The teeth in most instances will be found to be intact.

In certain rare cases necrosis of the pulp may exist, as in leukemia, increased intra-dental blood pressure, etc., and at times through a break in the enamel and dentin the pulp becomes secondarily infected and gangrene with its numerous consequences results. These latter disturbances are also readily diagnosed. In rare instances, as in locomotor ataxia, the secondary pulpitis manifests itself in a total absence of sensation or as a degeneration and it may be discovered by accident or intentionally by entering into the pulp chamber.

Pathologically, secondary pulpitis manifests itself within the pulp by the same symptoms as they are observed in other tissues. If the underlying cause is an infection from a local source it is usually of a mixed type and as a consequence its pathology differs in nowise from that of other types of pulpitis. If the secondary disturbance is dependent upon a general disease a discussion of the pathology of the latter, except the general facts, must be omitted at this moment. For a further elucidation of the subject the reader is referred to works on general or special pathology.

#### DIAGNOSIS.

Secondary pulpitis as a consequence of a primary local disturbance offers no



difficulties in its recognition. The existing pulpitis may be readily diagnosed by the various methods as usually employed in the diagnosis of diseases of the dental pulp. If the existing pulpitis is caused by general disease, an effort should be made to locate the predisposing disturbance. It is not to be assumed that the dental practitioner should be an expert diagnostician of general diseases, consequently the following diagnostic hints are merely cited as aids to a possible recognition, but by no means as an indication for the treatment of the respective ailment. The patient should at once be intrusted to the care of a general practitioner or a specialist for further observation. Of the general infectious diseases which are prone to cause secondary idiopathic disturbances in the upper teeth pre-eminently acute catarrh of the maxillary sinus should be mentioned. It is a very common occurrence indeed and, with Arkövy, who has given the first clear clinical picture of the symptomatology of this disease, the writer is fully in accord that one should not overestimate important things nor neglect things which may be of great value. The ready recognition of the underlying antrum disturbances as the true cause of the existing dental ailment combined with the subsequent treatment, which incidentally is usually successful, is a source of satisfaction to both patient and operator. Hence, a detailed discussion of the clinical phases of this dental borderline disease may not be amiss.

#### CLINICAL SYMPTOMATOLOGY.

*Acute nasal catarrh*, "cold in the head," is an acute catarrhal inflammation of the Schneiderian membrane which lines the nose and its accessory cavities. It is characterized by feverishness, feeling of discomfort in the head with the free discharge of watery, mucous or muco-purulent fluid. Acute nasal catarrh is principally brought about by an infection through sudden atmospheric changes. Exposure of the face and neck or the feet and ankles to cold draught and dampness are among

the usual sources. By continuity of the mucous lining of the nose an acute rhinitis or any other infection of a general character, such as influenza, pneumonia, scarlet fever, measles, etc., rapidly spreads to the antral sinuses. Anatomically, the maxillary sinus presents in its lower floor little hillocks which are the apical ends of the roots of certain upper teeth, *i.e.*, principally molars and premolars. Frequently these root ends protrude through its lower floor and are only covered by the mucous membrane of the antral cavity.

It is readily observed that an inflammation of this membrane which practically receives its blood and nerve supply from the same source as the adjoining teeth will rapidly spread to the pulps of the teeth within the affected region. A dull, painful sensation about the teeth and the bony region of the affected side of the face is the result. The patient cannot locate the painful teeth. The concomitant appearance of these symptoms points to a borderline disease of the teeth and the antrum and should be diagnosed as an acute catarrh of the maxillary sinus and secondary obstructive hyperemia of the pulps of the involved teeth. The disease occurs principally in severe winter weather and is much aggravated by a simultaneously existing influenza. During the winter of 1917-1918 the writer observed among the 650 students of the Evans Institute some thirty-five cases of this type. The prognosis is always favorable.

If by accident or otherwise an exposed pulp is entered and found to be free from sensation, a differential diagnosis will clarify the situation in regard to its cause. Senile degeneration (atrophy), locomotor ataxia or leukemia are the three primary diseases which may be responsible for this condition.

Degeneration of the pulp is restricted to the pulp tissue proper and is readily diagnosed in the exposed organ.

*Locomotor ataxia* is a disease principally observed in males of middle life. It is referred to as a chronic degeneration of the posterior nerve roots and is characterized by loss of co-ordination,

neuralgic pains in the limbs, loss of sensation and atrophic changes. The diagnosis is positive when the three following pathognomonic symptoms are present:

(1) Westphal's sign: absence of patellar reflex; (2) Romberg's sign: swaying of the body and inability to maintain erect position with closed eyes, and (3) Argyll-Robertson's sign: loss of pupillary reflex to light.

The chronic degeneration of the nerve endings, as an early symptom of locomotor ataxia is most interestingly demonstrated in the dental pulp and the periodental membrane. On entering an apparently normal pulp of a patient suffering with this disease it will be observed that this ordinarily most sensitive organ will not respond to the advancing dental broach and it may be removed without the slightest manifestation of pain. Spontaneous painless loosening of sound teeth, principally the molars and bicuspid of the upper jaw, to such an extent that they may be readily removed with the fingers, should always be looked upon as a pathognomonic symptom of an existing locomotor ataxia. Cases of this type should arouse grave suspicion and the patient should at once be put through the above-mentioned diagnostic tests. If they are positive, he should immediately be referred to a physician. The prognosis of locomotor ataxia is always unfavorable.

*Leukemia* manifests itself in an enormous increase in the number of white corpuscles with enlargement of the lymphatic glands, the spleen, etc. In the mouth leukemia produces characteristic symptoms, which are readily recognized by the trained observer. The gums are swollen, easily bleeding on being wounded especially near the dental papillæ, and the palate is often covered with small foci of coagulated blood. The gingival tissue frequently exhibits necrotic areas and presents a dirty, brownish, puffed ridge, which loosely encircles the teeth. The secretion of saliva and mucus is much accelerated and foul breath is very pronounced. In other words the picture presents a typical leukemic stomatitis. An examination of

the blood must be insisted upon to verify the diagnosis of this comparatively rare disease. The prognosis is always unfavorable.

*Malarial fever*, a paroxysmal fever, is characterized by a regular succession of definite states, *i.e.*, chills, fever and sweating, following by a period of complete intermission. It is caused by a protozoön present in the blood, the plasmodium malarie. When the characteristic chills, fever and sweating occur periodically the diagnosis is practically certain, although a blood examination is often desirable. Flagg, Ware, Garretson and numerous other writers have called attention to the relationship of odontalgia (secondary pulpitis) to malarial fever.

Especially significant in this respect are the observations of Marshall. He relates that, "It was my fortune or my misfortune, I might say, to practice for many years in a malarial district, and I saw a great many cases of neuralgia arising from malarial influences, as proved by quinin curing them without operation. I found pulpitis more difficult to control by the ordinary remedies in this district than I have found in any other place where I have practiced. There seems to be a hypersensitiveness of nerve tissue in these cases, and the ordinary remedies for controlling pulpitis do not seem to have the same effect. Abscessed teeth do not respond to treatment as readily in such districts as upon high land where malaria is not present." The writer, from his own observations, is in full accord with Marshall's statement regarding the relationship between malaria and secondary pulpitis. In sections of the country infested with malaria one should always be suspicious of a possible connection between malarial fever and secondary pulpitis.

*Increased intradental blood pressure* constitutes a most interesting etiologic factor in the production of secondary pulpitis. The credit of having first called attention in print to this interesting phenomenon belongs to Ferdinand Tanzer; although the late Dr. Garretson always emphasized this very same



fact in his lectures. The overfilled blood-vessels exert pressure upon their walls and, wherever they meet with resistance, compression results, which manifests itself as pain.

From an anatomical viewpoint, it is readily understood why this manifestation of pain is so much more pronounced in the dental pulp than in other tissues. As a consequence, any cause which may produce a general increased blood pressure will leave its imprint upon the dental pulp. If the dental pulp is pathologically altered by an overgrowth or some other developmental defect in its surrounding hard wall of dentin, or if it has undergone degenerative changes, the pain arising from a plethoric circulation, *i.e.*, a congestive hyperemia, is naturally more pronouncedly manifested in this particular diseased pulp than in a normal pulp.

While any dental pulp by virtue of an existing pathologic lesion may be selected as the point of minor resistance, usually the pulps of the second upper incisors and those of all the lower incisors are more often the victims, as they may be classified as "weak" teeth. Clinical observations substantiate this conception. The resultant hyperemia manifests itself primarily as a dull continuous pain which is much accelerated by sudden temperature changes. Aside from numerous general diseases which concomitantly produce high blood pressure, there are specifically two physiologic factors, *i.e.*, pregnancy and menstruation, which are prone to manifest themselves secondarily as pulpitis and, as a consequence, may induce the patient to seek the services of the dental practitioner.

Secondary pulpitis as an affliction of the pregnant woman is exceedingly common either as an aggravation of some ordinary complaint caused by the mechanical effects of the uterine enlargement, or it may result from a reflex neurosis due to the extraordinary stimulus acting on the genital tract, or from that interesting and little understood interference with general metabolism, toxemia of pregnancy.

Disturbances of menstruation are most

frequently met with in girls and young women. Practically every civilized woman suffers more or less discomfort and malaise at this period, the most common manifestations are pain and weight in the back and loins, abdominal cramps, headache, general lassitude, etc., occurring especially on the days before and during the menstruation. The increased blood pressure very frequently sets up a painful secondary pulpitis and hence the appeal to the dental practitioner for relief.

Regarding the diagnosis of these cases, it may be stated that a carefully worded inquiry will usually reveal the underlying cause. Overscrupulous and sensitive patients require tactful handling. If the true cause is ascertained an assurance may be given that with the termination of the physiologic disturbance the painful tooth will return to its normal state of health without further treatment. In rare instances, a pulp may die from the effects of increased intra-dental blood pressure.

*Chlorosis*, a pronounced type of anemia, is principally met with in young girls about the age of puberty and manifests itself as a marked decrease of the hemoglobin content of the blood. It is chiefly associated with disorders of menstruation. As a not infrequent complication, a dull, continuous toothache in otherwise apparently sound teeth is observed. The underlying cause of this type of secondary pulpitis is usually recognized at once by the color of the patient. The change of the complexion is marked, *e.g.*, blondes become pallid and waxy and brunettes, muddy and grayish with bluish-black rings under the eyes.

Chlorotic patients often manifest an increased tendency to dental caries. At present it is assumed that chlorosis causes a disturbance of internal secretions and the resultant change interferes with the calcium metabolism and thereby creates a predisposition to dental caries. Suitable treatment consisting of plenty of food, fresh air, rest, and iron will assist the patient in her return to normal health and thereby incidentally the secondary pulpitis is eradicated.



The prognosis of a pulp afflicted with secondary pulpitis depends upon its original cause. If the secondary disturbance is brought about by a local infection of the investing tissues of the tooth, the concomitant routine treatment of the initial cause and the existing pulpitis will restore the pulp or the pulpless tooth to its former usefulness. In case the secondary pulpitis is the sequence of a hematogenous infection or a derangement of the blood in regard to quality and quantity, the prognosis for the ultimate recovery of the pulp is usually favorable. Leukemia and locomotor ataxia are unfavorable predisposing causes; these diseases usually are fatal.

#### TREATMENT.

The treatment of a pulp afflicted with secondary pulpitis depends primarily upon the recognition of the predisposing cause. If the existing pulpitis is a sequence of a local infection, a correct diagnosis of the condition of the diseased pulp will clearly indicate the method of treatment. It is to be understood that the primary cause, of necessity, must also be eradicated. If the secondary pulpitis manifests itself as an obstructive hyperemia, or even a mild type of acute pulpitis as a sequence of a hematogenous infection caused by a general disease, such as an acute catarrh of the antrum, influenza, malaria, etc., or an exanthematous disease, such as measles, scarlet fever, etc., the successful termination of the causative diseases usually restores the affected pulp to its former usefulness. The restoration of the afflicted pulp to its normal activity under these conditions furnishes a splendid example of the ancient medical aphorism: *Cessante causa, cessat et effectus*—When the cause is removed, the disease is also removed. If the operator has satisfied himself that his patient suffers from a secondary pulpitis with no perceptible manifestations of local lesions and with no indications for specific dental treatment, he should always direct the patient to consult a general practitioner or a specialist, as the case may be, accompanied by such

information as to guide him in regard to the apparent nature of the underlying ailment.

The treatment of a type of secondary pulpitis, which as we have pointed out above should be classified as a dental borderline disease, that is, the simultaneous appearance of an acute catarrh of the maxillary sinus and an obstructive hyperemia of the pulps of the upper teeth of the afflicted side, requires detailed discussion. A patient suffering with this most annoying acute disturbance, which manifests itself as a severe continuous, dull, painful sensation of the affected side of the face and principally of the teeth within this region, usually consults his dentist first and insists—and rightly so—that the pain is primarily located about his teeth.

If the dentist has correctly diagnosed the condition, the following symptomatic treatment will give excellent results: The patient is ordered to bed, a light, nutritious diet is prescribed and he is advised to take ten grains (0.65 Gm.) of acetylsalicylic acid (aspirin) every two hours with a cup of hot tea or a glass of warm water. Before going to sleep a hot lemonade is advised to promote free perspiration. Twice during the day the hot water bag should be placed upon the afflicted side of the face for one-half hour. The nose and the mouth should be rinsed at frequent intervals with a warm physiologic salt solution. A saline cathartic after the termination of the treatment is beneficial. The patient should be cautioned against exposure to draft, as acetylsalicylic acid seemingly predisposes to aerobic infection. Usually within a few days all symptoms have disappeared and complete recovery is assured.

Occasionally a somewhat similar effect of an exposure to chilly, damp air manifests itself in the lower jaw. A painful obstructive hyperemia of the pulps of the lower teeth of the affected side is the direct sequence. Principally, however, it is the temporo-maxillary joint which has to bear the brunt of the burden and it responds with a painful, acute inflammation in its synovial membrane. On

opening the mouth a "cracking" sound or a distinct momentary locking is observed, which is the result of the swollen intra-articular fibro-cartilage being caught by the moving condyle. The condition may be referred to as an acute mandibular arthritic inflammation or as an arthro-rheumatic affection of the temporo-maxillary joint.

The treatment of this dental borderline disturbance, *i.e.*, secondary pulpitis and mandibular joint inflammation, is precisely the same as that suggested

above with one important adjunct—temporary rest of the joint. The simplest method to obtain this required rest consists in applying a head-and-chin bandage padded with a thick layer of cotton about the affected region to be worn during the night and, if possible, the greater part of the day. The writer has seen most satisfactory results from this symptomatic treatment.

40TH AND SPRUCE STS.

(To be continued.)

## Histo-pathology of the Jaws and Apical Dental Tissues.

No. X:

### Abscesses—Alveolar Abscesses.

By EUGENE S. TALBOT, M.D., D.D.S., Chicago, Ill.

UNDER the heading, "So-called Alveolar Abscesses," I explained and demonstrated how absorption of bone at the apex of the root of a tooth could progress by irritation without infection and inflammation. In the true alveolar abscess infection and inflammation always occur. It is unnecessary for me to enter into a long discussion of the various causes which produce these pathologic conditions. Ziegler<sup>1</sup> in a nutshell makes the following classification: "The causes of inflammation may lie either in mechanical, thermal, electrical or chemical influences, as well as in the influence of parasites. The common characteristic of all these injurious agencies is the production, in the first place, of a local tissue degeneration, which, when of a certain extent and intensity, is associated with disturbances of the circulation and of vascular secretion."

In the formation of an alveolar abscess the mechanical irritation and the parasitic infection always occur in the dental pulp or other sinuses on the root of the tooth. In a majority of cases the effect of these causes is located at the apical end of the root. In the human we have seen that the normal consists of one straight canal extending from the pulp chamber through the dentin and cementum at the end of the root. It often occurs, however, as we have seen, that other degenerative openings are located at any point in the interdental-cemental space and are found in the substance of the dentin and cementum, and at any locality along the root of the tooth. They are often seen branching fan-shaped, toward the end of the root. Not infrequently the opening of one of these collateral branches is larger than the main canal. When this is the case the infection and inflammation usually take place at this locality rather than at

<sup>1</sup> General Pathology, Tenth Edition, p. 314.



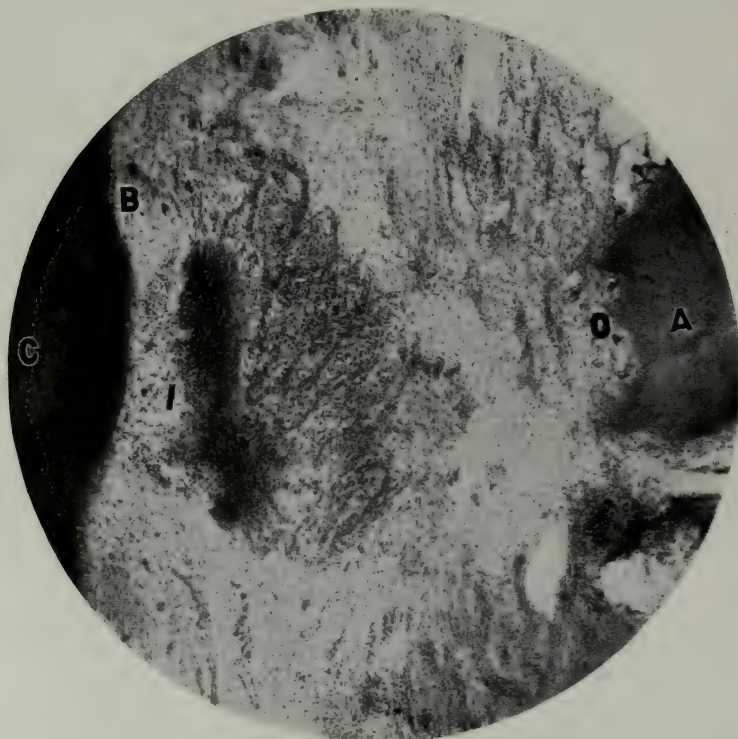
the opening of the main canal. Frequently an alveolar abscess will form at one opening, and irritation with absorption of bone will occur at the other, or irritation, inflammation and bone absorption may result without infection and abscess.

When death of the pulp occurs, if the tissue is allowed to remain in the canal or any of the sinuses in connection with

fore dispense with the description of inflammation and abscess formation. The poisons and toxins which have developed in the pulp canal or other sinuses enter the tissues outside the tooth and set up inflammation.

Figure 1 shows the side of a root of a human third superior molar: A is the alveolar process, B the peridental membrane, C the cementum, O osteoclast ab-

FIG. 1.



(Magn. 70.)

the dentin or cementum, decomposition results. The disease may be transmitted directly through the root channel or micro-organisms may pass through the opening into the blood. Owing to the endotransitory nature of the alveolar process a lowered resistance is always present, and nature is always waiting for irritation and inflammation to cause destruction of tissue.

The phenomena of inflammation are familiar to all students. We shall there-

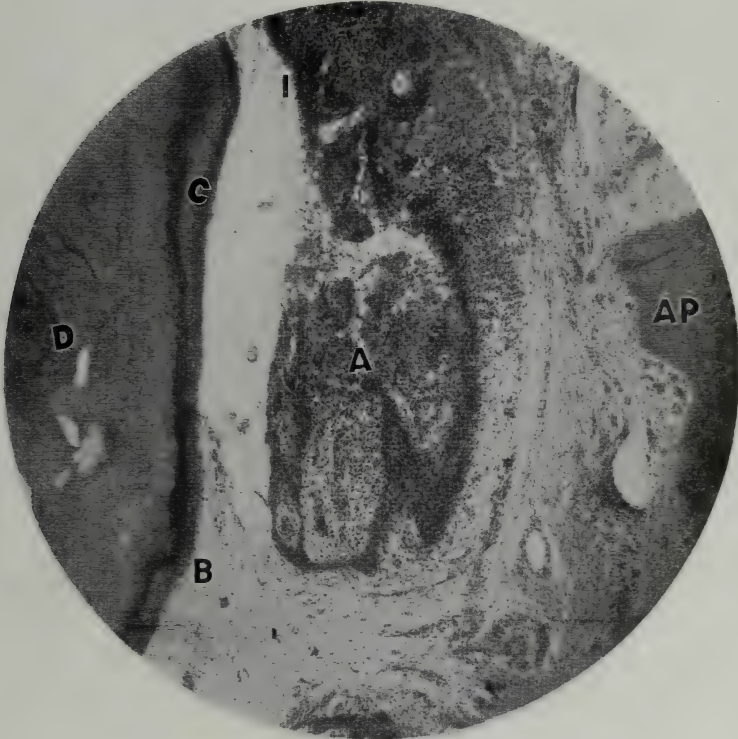
sorption, and I active inflammation. The apical foramen does not appear in this picture. The inflammation is located higher up on the root at an opening which cannot be seen. The canal extends through the dentin and cementum to the surface. The foci of inflammation may be seen near the root of the tooth. This would eventually have become an abscess. Note that destruction of bone, as we have seen in all the other pictures, precedes inflammation. Inflammation



could not possibly occur in normal, healthy bone tissue, but only in fibrous tissue after the calcium salts have been absorbed away. In my student days I was taught that an alveolar abscess was formed by the pus first collecting between the root of the tooth and the periodontal membrane; that the periodontal membrane acted as the pus wall. Even some of the latest writers state: "The

tooth is being entirely destroyed, and that the fibrous tissues which once contained the lime salts are forming into a sac-like wall to limit the area of inflammation and infection and to wall off the sac contents and prevent them from entering the tissues beyond. Along the bone margin may be seen osteoclasts still absorbing the bone tissue quite a distance from the area of infection. The decom-

FIG. 2.



(Magn. 70.)

so-called abscess sac is a strong, fibrous capsule, this being composed of proliferations or pre-existing fibers of the periodontal membrane." While this is possible, many abscesses form outside and beyond this membrane. The fibers which form the sac wall develop from the fibers of the bone tissue, which become organized into the fibrous layer surrounding the lesion. It will be seen that the periodontal membrane between the foci of infection and the root of the

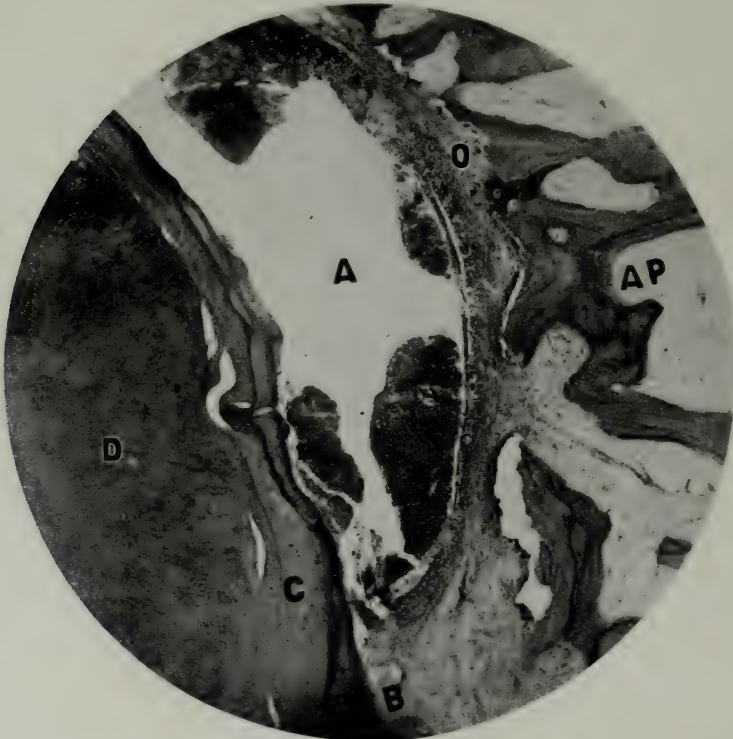
posing soft tissue in the interdento-cemental space on the side of the tooth which causes the infection does not show in this picture.

Figure 2 shows an abscess at the side of a human second right superior bicuspid tooth, the result of a dead protoplasm in the interdento-cemental space: A is the abscess, AP the alveolar process, B the periodontal membrane, C the cementum, D the dentin and I active inflammation. The interdento-cemental

space is well shown. This abscess is in advance of the previous one, showing the sac wall well developed containing the broken-down tissue and pus formation. The peridental membrane between the inner surface of the abscess and the tooth has been entirely dissolved, the root of the tooth acting as part of the abscess wall. The bone structure was destroyed some distance from the sac wall and

the root of the tooth, the wall of the abscess, upon the other side. Osteoclast absorption may be seen at the edge of the bone beyond the abscess. The interdento-cemental spaces with the external epithelial layer of the enamel organ between the dentin and cementum and an artery space extending through the cementum where the irritation and infection originated may be seen at the side

FIG. 3.



(Magn. 26.)

osteoclasts may be seen along the border of the bone, still producing absorption.

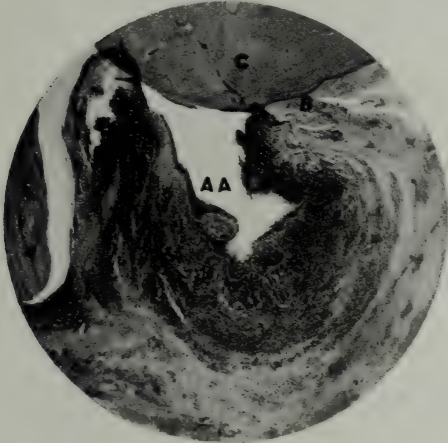
Figure 3 shows a well-developed abscess upon the side of the end of the root of a superior left third molar: A is the abscess, AP the alveolar process, B the peridental membrane, C the cementum, D the dentin, and O osteoclast absorption. The periosteum is entirely destroyed by absorption, the walls of the abscess made up of the fibrous tissues originally holding the lime salts on the one side, and

of the root of the tooth. The discharge of pus took place along the root of the tooth at C.

Figure 4 shows a fully developed alveolar abscess upon the end of the root of a human bicuspid tooth: AA is the abscess, A the alveolar process; B the peridental membrane, and C the cementum. Three or four canals branch out fan-shaped from the dental pulp at the interdento-cemental space. The peridental membrane is destroyed for some distance

upon each side of the end of the root. The bone has absorbed away some distance from the end of the root from irritation and the sac wall has become organized out of the fibrous tissue. A small spicule of the necrotic alveolar process came away with the abscess when the

FIG. 4.



(Magn. 16.)

tooth was extracted. The pus in this case had burrowed its way along the root of the tooth at the left to the surface.

In active infection and inflammation there is always redness, heat, pain and swelling to a most excruciating extent. Especially is this the case when the hard, dense, compact bone is involved. Pus from such a cavity may burrow its way

through to the surface forming a fistulous opening, or absorption of pus may take place.

Alveolar abscesses whether located at the apical end or at any other part of the root develop a heavy, thick fibrous wall unlike periodontal abscesses, which always have very thin or no walls. I wish here to correct a statement in a late work on this subject which says, "The bone is destroyed as suppuration progresses and the cavity fills with pus." All of my pictures in this series of articles and hundreds of sections in hand show that bone absorption due to irritation precedes inflammation and pus formation. The pus is contained in the sac and bone absorption has proceeded quite a distance beyond the sac wall in which the pus is confined. The fibrous tissue or trabeculae always extends some distance between the sac wall and the edge of the absorbing bone.

In extracting an alveolar abscessed tooth, if the outer walls of the sac or a part of the periodontal membrane is in normal relation to the cementum, these fibers are stronger than those of the bone tissue which assisted in sac formation. The abscess will come away with the tooth. On the other hand if the periodontal membrane is entirely destroyed and the cementum denuded of tissue, the fibers of the alveolar process having greater resistance, the abscess remains in the tissue when the tooth is extracted.

31 N. STATE ST.

(To be continued.)



## What Every Dentist Should Know About Mouth Diagnosis.

By H. J. KAUFFER, D.D.S., New York City.

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(Read before the Central Dental Association of New Jersey.)

**D**ENTISTRY, in its relation to the medical profession, today occupies the position that it has sought for many years. Unfortunately, this was brought about largely through the error of indiscriminate devitalization of teeth, together with faulty root-canal technique and the subsequent apical infection. The physician, who is endeavoring to locate a suspected focus of infection, is every day referring such patients to the dentist for mouth examination. However, apical infection and pyorrhea are not the only conditions of diagnostic value observed in the mouth. To recite a brief but careful study of the most frequent of this class of pathology with clinical manifestations, is the purpose of this paper.

There was a time not long passed when the dentist considered that his only duty to his patient was to fill decayed teeth or extract them and replace these teeth with artificial dentures. However, in this day of preventive medicine, a dentist should be able to recognize any oral manifestation of disease and thus become a more valuable adjunct to the science of medicine.

### IMPORTANCE OF CO-OPERATION BETWEEN PHYSICIAN AND DENTIST.

When it is considered that a patient sees his dentist on an average of once a year, and only consults his physician when he feels ill, it is obvious that the dentist who is able to recognize the oral symptoms of numerous systemic disturb-

ances and will advise the patient to consult his physician, will save much valuable time, for treatment would then be started long before the patient would have been conscious of the disease. This is especially true in syphilis, malignant growths and diseases associated with metastatic infection. In this latter condition, it is my firm conviction that the dentist should always collaborate with the physician in the care of these cases, as there frequently exist obscure complications which the dentist would not recognize.

It is my opinion that the dentist should become a diagnostician in his particular field, but should never attempt to advise in the treatment of any systemic disturbances evidenced by mouth manifestations, but should always refer the patient to his physician and notify the physician either by telephone or mail of the condition observed. It is not wise to send a verbal message by the patient to his physician, as confusing complications may arise. When the medical profession realizes that the dentist can intelligently make a mouth diagnosis then will dentistry receive its place in group diagnosis.

In making a mouth diagnosis, it is necessary to systematize one's work. To meet this requirement I have arranged a chart which will show all dental findings at a glance. (See chart.) Following this chart, I use a sheet for remarks, upon which I note the history of the case, pathological findings, if any, and my conclusions.

## CHART.

HOURS 9 TO 5  
BY APPOINTMENT ONLYH. J. KAUFFER, D.D.S.  
112 WEST 72<sup>ND</sup> STREETTELEPHONE  
4800 COLUMBUS

## MOUTH DIAGNOSIS

Mr John Doe  
101 West 72 Street  
Referred by Dr. E. E. SmithELECTRIC TOLERANCE { UPON TOOTH 25 (NORMAL 35)  
UPON LOWER LIP 25 (NORMAL 25)

AN X IN A SQUARE SIGNIFIES TOOTH OPPOSITE THAT SQUARE IS MISSING. C THAT TOOTH IS CROWNED AND THE FIRST THREE TESTS CANNOT BE APPLIED. 1 THAT TOOTH IS NORMAL. 2 TO 4 DESIGNATING THE DEGREE AWAY FROM NORMAL.

					CONDITION	TREATMENT INDICATED
UPPER LEFT	X					
	1	1	1	1	Normal	
	1	1	1	1	Normal	
	C		4	1	Abscessed	Extraction
	X					
	4	4	2	1	Devitalized X-ray normal.	
	C		4	1	Abscessed	Extraction or root amputation.
	1	1	1	2	Slight Pyorrhea	Pyorrhea treatment
	1	1	1	2	Slight Pyorrhea	Pyorrhea treatment
	4	4	4	1	Abscessed	Extraction or root amputation
UPPER RIGHT	1	1	2	1	Normal	
	4	4	4	1	Abscessed	Extraction
	X					
	1	1	2	1	Normal	
	1	1	1	1	Normal	
	X		2		Impaction	Removal
	1	1	1	1	Normal	
	4	1	4	2	Incomplete root filling No apical rarefaction.	Pyorrhea treatment. Consider doubtful
	X					
	C		4	1	Abscessed	Extraction
LOWER RIGHT	1	1	3	1	Normal	
	1	1	2	1	Normal	
	1	1	1	1	Normal	
	1	1	1	1	Normal	
	1	1	1	1	Normal	
	1	1	1	1	Normal	
	1	1	1	1	Normal	
	1	1	3	1	Normal	
	C		2	1	Incomplete root canal filling, no apical rarefaction.	Doubtful
	X		4		Necrotic	
LOWER LEFT	1	1	1	1	Normal	
	X					

DATE Feb. 20th, 1920

RESPECTFULLY

H. J. Kauffer

## EXAMINATION OF THE PATIENT.

I find that one can best examine the mouth of the patient in a dark room, using an electric head-light for illumination, and the electric mouth-light for transillumination.

After carefully examining the soft tissues our next step in mouth diagnosis is to apply what is known as the pulp test. This test is made with an instrument, so arranged that with it one can pass from one-tenth of a volt to forty volts of electricity with an amperage ranging from one to five milliamperes through a tooth and, by the degree of sensation, determine its vitality.

First apply the electrode from the cathode (or negative pole) to the lip, having the patient hold the anode (or positive pole) electrode in the hand. The assistant then turns the handle of the rheostat on the pulp-testing apparatus. To this handle is attached a pointer which revolves around a scale, which is divided into units registering from one to a hundred. Each unit represents about four-tenths of a volt. A normal person should commence to feel sensation at from fifteen to twenty-five units, or from six to ten volts. At about twenty-five units of electricity upon the moist lip of a normal person, one usually gets a motor impulse, which is recognized by a twitching of the lip.

If one can apply over fifty units of electricity to the lip of a patient without producing a marked sensation, he is dealing with a patient who has a faulty nerve metabolism. At the Vanderbilt Clinic I found that patients with advanced tabes or paresis would stand from eighty to a hundred units upon the lip without experiencing any sensation, and without the electricity producing any motor impulse. This test can be further continued by reversing the poles. Neurologists have found that the normal sensory nerve is most sensitive to the electric cathode (negative pole), whereas, in tabes or other diseases associated with nerve degeneration, the sensory nerves register more pronouncedly to the anode (or positive pole). Therefore, if one has a patient who experiences the greater

sensation at the anode, in all probability, he is dealing with a patient who should consult a neurologist, and a diagnosis may be made of some serious ailment before other manifestations, such as, in syphilitic tabes and paresis, loss of sight, loss of memory, unsteady locomotion, etc. are observed. These manifestations are frequently the first recognized symptoms of these diseases and when recognized, very often the patient is beyond the possibility of medical help.

By first applying the electrode to the lip, we have also established the amount of electricity required to produce sensation in the individual being examined. The lower anterior teeth, if normal, usually require about ten units more of current to produce a mild sensation than did the lip. That is thirty-five (35) units should be high normal upon lower anterior teeth, if twenty-five (25) units was the point at which sensation was experienced upon the lip. Teeth which are worn down or abraded and still have healthy pulps require, proportionally to the degree of abrasion, less electricity to produce sensation than does the normal tooth. Posterior teeth and teeth of old people require higher voltage. Thus the number of units required to produce sensation is in direct ratio to the amount of tooth substance between the pulp and the tooth surface. One must avoid touching metal caps or fillings or tooth caries with the electrode, or the patient will receive an unpleasant shock. Also, if there are approximating metal fillings in approximal teeth, an insulating material such as a piece of rubber dam should be placed between the fillings, or the electricity will leak from one tooth to the other and thus give a faulty reading. All these points must be carefully studied if one wishes to intelligently apply this test for pulp vitality.

Our next step in mouth examination is to apply the spark from a violet-ray tube or a fulguration instrument to the teeth. Thus with an induced current, checking up the findings of the pulp-testing apparatus. This is a valuable test, especially in old people, where calcification of the tooth structure has ad-



vanced in many cases almost to the entire elimination of the pulp.

The next step in mouth examination is to transilluminate the teeth with a small mouth-light. With the anterior teeth, place the light to the lingual or palatal surface of the teeth and view them from their labial aspect. With posterior teeth, the light is placed halfway between the gingivæ and the occlusal border, and the teeth viewed through the cusps. If the tooth structure is translucent the tooth may be considered normal. In devitalized teeth, where putrefaction has taken place within the tooth, one observes a characteristic blue gray opacity. Of course large fillings or decay eliminate this test.

I now find it convenient to transilluminate the maxillary and frontal sinuses. The physician should be notified if these sinuses do not transilluminate clearly.

Any clinical evidence of pyorrhea is noted, the extent of which is also shown by the amount of alveolar resorption observed in the X-ray films. All teeth with caries are indicated on the chart. This entire examination is made in a dark room, using an electric head-light for illumination.

#### RADIOGRAPHING THE TEETH.

The teeth and their supporting structures are now radiographed. I make in all eleven small films using six to include the upper teeth, and five for the lower. I also make two large films (Eastman No. 2) of the maxillæ, one of the right and one of the left, and a five by seven (5 x 7) "dupli-tized" film exposing the entire half of the jaw, one for the right side and one for the left. Also, if the sinuses do not transilluminate clearly, I make an antero-posterior film of the head.

#### BLOOD ANALYSIS.

Blood analysis is sometimes of value in the mouth diagnosis, as it is a well-established fact that certain grades of anemia are almost always present in patients who harbor focal infections. Patients with pyorrhea, who have a hypochlorhydria, may show a high leukocyte

blood count, as would also be the case in acute alveolar abscesses. Therefore, pyorrhea in a patient with a lack of gastric juice is decidedly more dangerous to the health of that individual than to one with a normal gastric fluid.

There has been considerable discussion at dental meetings recently in regard to the blood count and its relation to apical abscesses, many men maintaining that a leukocytosis and lymphocytosis gave a good index to the patient's resistance to this class of infection. This possibility came to my mind about two years ago, at which time I tried it out and was disappointed with the findings.

In cases with a great number of apical abscesses, where one would naturally expect to find a high leukocyte and polymorphonuclear count, the count was about normal—8000 leukocytes and 65 to 70 per cent. polymorphonuclear, while twelve hours after the teeth were extracted the count went up to from 20,000 to 22,000 leukocytes with 75 per cent. to 85 per cent. polymorphonuclear.

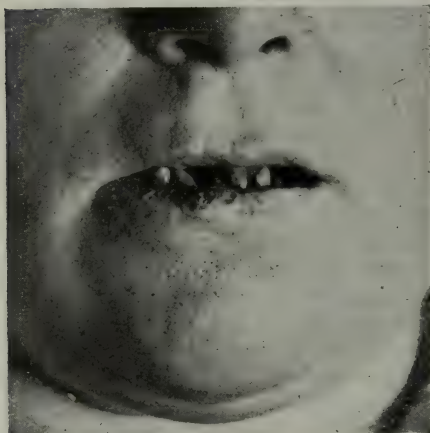
This finding is readily explained when we consider the etiological factors which bring about a leukocytosis, *i.e.*, the organisms destroy the tissue cells, during which process a chemotactic substance is produced. This chemotactic substance encourages the production of leukocytes which are hastened to the infected area. The chemotactic substance, therefore, is not the product of the organism alone but of the tissue cell. In an apical abscess, where the bacteria are all walled in and cease to attack the tissue cells to any marked extent, there is no chemotactic substance produced, therefore, no leukocytosis. However, when the tooth is extracted and the protecting wall broken down, there is a sudden setting free of a great number of active organisms which immediately attack the tissue cells, and so we get a leukocytosis.

#### EXAMINATION OF SOFT TISSUES.

In examining the soft tissues including the pharynx, tonsils, and fauces, remember that the tonsil described as the second degree Mayo tonsil, which is a small tonsil with deep crypts, is generally more infectious than the en-

larged tonsil which is most distressing, due to a mechanical interference when swallowing. The attention of the phy-

FIG. 1.



Epithelioma of the lower lip. When recognized at this stage the chances for cure are favorable. Note the broken-down tooth just behind the growth. The sharp edge of this tooth was probably the exciting cause of the growth.

FIG. 2.

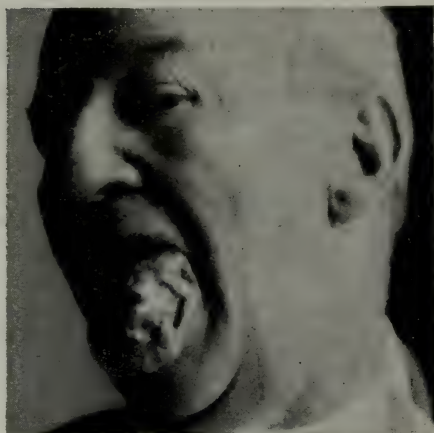


Epithelioma of the lower lip. When recognized at this stage the chances for cure are doubtful.

sician should be called to any pathology noted here, or the patient referred to the specialist in nose and throat.

Note any abnormal enlargement of the tissues, tissue abrasion, or circumscribed alteration in the color of the membrane, remembering that any abnormal tissue enlargement or growth which is persistent must be regarded with apprehension, unless there is a well-established benign cause. Never make a section of any growth for histological examination unless you are prepared for the immediate surgical removal of the growth. It is a well-recognized fact that in making a section one encourages a rapid develop-

FIG. 3.



Epithelioma of the tongue and submaxillary gland. When recognized at this stage it is fatal.

ment of the growth, especially if it be malignant. If possible, it is better to determine the nature of the growth by its clinical aspect, and this can only be done in its early stage by one familiar with this particular pathology. With foreign growths, especially in soft tissues, the absence of pain and slow development are alarming symptoms.

When abrasions are met with in the mouth, their cause should be ascertained. If they are mechanical, as from a sharp point of a broken-down tooth, root, or a filling, crown, bridge, or denture, the cause should be immediately removed or corrected. If the lesion does



not heal promptly under usual care, the case should be referred to a specialist, as these are among the most frequent causes of malignant growth in and about the mouth.

#### CANKER SORES.

Of the circumscribed discolorations observed in the mouth, the most frequent is an isolated form of aphthæ (the canker sore). In children, especially during dentition, this sore may appear in multiple form. In adults, the favorite

FIG. 4.



Mucous patches of the tongue. Two mucous patches can be seen upon the side of the tongue. The one near the tip is round, the other is irregular in shape.

site for this sore is the junction of two mucous surfaces, namely, the gum with the lip or cheek or in the floor of the mouth close to the gum or tongue. It first appears as a redness diffused over a limited area, followed by a hard nodule, the center of which breaks down; the epithelium is lost, and the surface assumes a rough, yellowish white coating, which is readily removed. Extreme localized pain characterizes this lesion and distinguishes it from the mucous patch which simulates the canker in late development.

#### MUCOUS PATCHES.

The mucous patches of secondary syphilis are usually multiple. They are syphilitic papules, occurring in moist

FIG. 5.



Mucous patches upon the lower lip. A number of mucous patches can be seen upon the lower lip; they are irregular in shape and coalescing.

FIG. 6.



Ulcerative mucous patches of the lower lip.

situations. They form on all mucous surfaces, but especially in the mouth, where they are most persistent symptoms of syphilis, complicating both the early



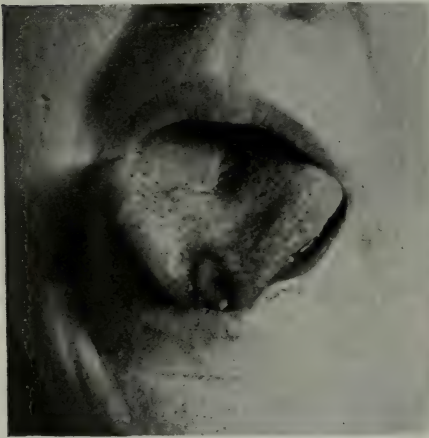
and late secondary stage of the disease. Unlike the canker sore, which in its early development is red, the mucous patch first appears as a copper-colored mottling of the mucous surface, later assuming a roundish or oval, tumid, flattened or very slightly raised, pale-rosy or whitish spot, and resembles very much a patch produced by touching the mucous membrane with silver nitrate.

If carefully examined, most of the mucous patches exhibit a loosened and partly detached film of membrane cover-

irritation cause them to ulcerate. The mucous patch is highly infectious. The presence of *Treponema pallidum* confirms a diagnosis.

One not familiar with these organisms is very apt to be confused when examining them microscopically, as the difference in the various spirilla is not easily observed. The *Treponema pallidum* is a spiral with seven or eight turns. It moves slowly and rotates about its axis. The *Spirochaeta buccalis* is thicker than

FIG. 7.



Chancre of the tongue. A large chancre can be seen upon the tip of the tongue.

ing the tissue, beneath which a reddish raw surface appears. They are usually in groups often coalescing and, unless ulcerated, are rarely accompanied with soreness, which, as I have said before, distinguishes them from the aphthous patches in the mouth resulting from indigestion or local disturbances, which latter patches are generally extremely painful, especially to touch, and almost always present a single patch. Sharp, broken-down edges of teeth or roots, as well as rough edges of fillings, bridges or dentures, will encourage the development of mucous patches in syphilitic mouths, and greatly accentuate their size and irregular form, and by excessive

FIG. 8.



Chancre upon the lower lip. Syphilides—the skin manifestation of syphilis—can be seen upon the body and face.

the pallidum, has irregular turns and an active snake-like movement. The *Spirochaeta dentium* is finer than the pallidum and has very regular curves, which are closer and steeper than the pallidum, and moves about its long axis.

#### ACQUIRED SYPHILIS.

In acquired syphilis the first evidence of the disease is the initial sclerosis or chancre which appears about the twenty-first day after infection, although it has been known to appear as early as the seventh day and as late as the ninetieth day after infection. This interval, de-

scribed as the first incubation period, usually occupies from ten to thirty days and is followed by the second period of incubation, which may extend over a period of from four to twelve weeks. During this period, there is a gradual enlargement of the superficial lymphatic glands. If the primary lesion is upon the lip, the sub-maxillary glands are affected. If upon the tongue, the sub-hyoid glands are the ones involved. Those nearest the lesion are enlarged first; later the others are involved. The

FIG. 9.

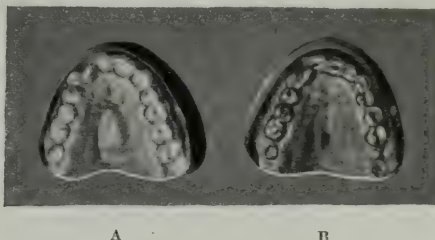


Carcinoma of the tongue. Patient had a four plus Wassermann and gave a luetic history.

usually circular in outline, are very slightly depressed and rest upon delicate beds of sclerosed tissue—the so-called “parchment induration.” The papule presents a well-circumscribed macular discoloration of the membrane, where, without careful examination, its elevation would not be noted, but accompanied, however, by the usual induration of its base. The presence of *Treponema pallidum* confirms a diagnosis.

Syphilides, the skin manifestation of syphilis of great importance from a diagnostic point of view, are frequently observed in the mouth as a result of local irritation from smoking.

FIG. 10.



Gumma of the hard palate. Patient presented with a gumma of the hard palate, A. He had a four plus Wassermann, but refused antisyphilitic treatment at this time. He returned in three months with a perforation of the hard palate, B.

#### GUMMA.

In syphilitic mouths one quite often will find gummata. They develop in strictly circumscribed, firm, well-defined, painless and indolent nodules or tumors; they usually grow very slowly, assuming a livid reddish or purplish hue, finally break through the membrane, and a thick, serous secretion escapes. The gummy character of this secretion gives the lesion its name. In the mouth a favorite site for the gumma is the hard palate, where it frequently resolves in a perforation of the hard palate, which perforation is most persistent and difficult to reduce. The tongue, lip and soft palate are also predilective sites for the gumma.

Peg-shaped, pitted teeth, as first de-

enlargements are usually from the size of a pea to that of a nut, are hard, painless, indolent, freely movable and with no tendency to break down or suppurate. The tonsils are often inflamed during this period and the patient experiences pain when swallowing. There is also a characteristic hoarseness. Examination of the blood reveals a typical grade of anemia with leukocytosis, all of which point to the fact that a general intoxication is in more or less rapid evolution.

The chancre, according to Montgomery, “in the United States from five to ten per cent. is found upon the lip, tongue, tonsil or palate.” Occurring upon mucous surfaces these lesions are influenced by heat, moisture and friction. Here the superficial erosions are



scribed by Hutchinson in 1857, and supernumerary cusps particularly upon the six-year molars, are recognized as diagnostic symptoms of congenital syphilis, although not accepted as such by many authors. Joseph Cavallaro's work

velopment when the vesicles have erupted and the contents coagulated, this lesion may simulate a chancre which has become encrusted or an eroded mucous patch.

#### LEUKOPLAKIA.

Leukoplakia or Smokers' Patch usually presents a dull white coating of the mucous membrane. It may appear at any part of the mouth, but its favor-

Fig. 11.

Fig. 12.

Fig. 13.

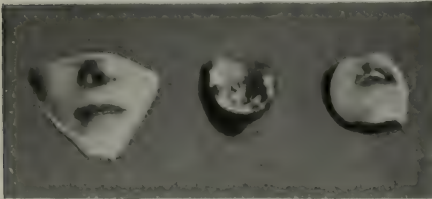


Fig. 11: Infantile cicatrix of heredo-syphilis (Hutchinson's teeth). Observe radiating scars in the vermillion and skin of upper and lower lip. The patient was of a luetic mother and had a four plus Wassermann, and has a marked hypoplasia of the incisor teeth and first molars.

Fig. 12: Necrosis of the hard palate. When the patient presented she gave a history of having been on antisyphilitic treatment for two years. She denied any knowledge of having had syphilis. She said she had a sore on the roof of her mouth, for which she was given large doses of mercury. Then the sore became progressively worse while under treatment. When we first saw her there was a perforation of the hard palate and a large necrotic sequestrum. Her Wassermann was negative. The mercurial treatment was stopped and the patient was given potassium iodid. The necrosed tissue was removed and several months later the perforation was successfully closed by uraniscoplasty. This was a case of mercurial necrosis, as the sore healed promptly and the soft tissues united when surgically approximated, all of which probably would not have been the case had the patient been a syphilitic.

Fig. 13: Herpes labialis (fever sore).

in the DENTAL COSMOS of 1908 and 1909 is the most thorough and valuable treatise upon this subject.

Herpes labialis is frequently observed and easily recognized. It develops rapidly, usually at the onset of a cold. It is characterized by local soreness and fever. When it presents in a single group especially in the late stages of de-

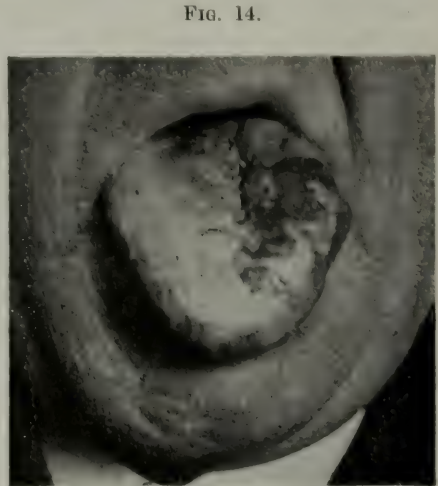


Fig. 14.

Leukoplakia and epithelioma of the tongue.

The patient, a syphilitic, had a leukoplakia on the tongue upon which an epithelioma developed.

*Note.* It has been observed that epithelioma is frequently laid down upon a syphilitic base, and that the growth is encouraged by the use of arsenic, as when salvarsan or one of its derivatives is used. Therefore this drug should be avoided in those cases.

its site is the tongue, hard palate, and the muco-buccal surface. It has the appearance of a mucous surface which has just been touched with nitrate of silver. It is claimed by some authors that leukoplakia is 100 per cent. syphilitic, while other careful observers place the percentage at less than 10 per cent. The condition is excited by a mild irritation, such as smoking, and chemical irritants, such as excessive use of spices, alcohol, etc. Epithelioma is frequently developed at the site of leukoplakia; especially is this true among syphilitics.



Tubercular lesions are found in the mouth, particularly in the late stages of the disease. Ulcers may form, which are round or irregular in shape, painful and extend rapidly. Their base is granular, bleeds easily and is partly covered with a sticky discharge. On mucous membranes the margins are as a rule undermined. Tubercular bacilli, which are always present, confirm a diagnosis.

The various forms of stomatitis observed in the mouth have occupied a prominent space in dental literature for

FIG. 15.



Tubercular ulcer upon the tongue. Tubercular bacilli, which are always present, confirm a diagnosis.

years, and I am sure you are all familiar with this subject. I shall therefore only speak of Vincent's disease, recently called "Trench Mouth." This is an ulcerative form of stomatitis, which attacks the mucosa at its gingival border. It presents a highly inflamed, scarlet-red margin with a grayish white base, is extremely painful, and bleeds readily. There is a characteristic fetid odor. The presence of Vincent spirilla and fusiform bacilli confirm the diagnosis. The disease responds readily to chlorate of potash used as a mouthwash and taken internally in five-grain doses three times daily. Under this treatment it clears up in from five to seven days. The kidneys should be watched carefully when chlorate of potash is given in internal doses. This disease has been

prevalent in the army and among civilians of late.

Furuncle or carbuncle of the lips and face should be diagnosed early and immediately lanced. The percentage of fatality from furuncles in this site is great, due to a thrombosis of the cavernous sinus of the dura mater. This resolution is explained by the fact that the facial vein communicates freely with the ophthalmic veins, neither of which veins contains valves.

Bacteriological investigation especially in certain types of infection has a distinct place in mouth diagnosis. However, this subject would require a whole evening for discussion. Therefore, in passing I merely state that in cases where there may exist a reasonable element of doubt as to whether a rarefied or condensing osteitis as shown by the X-ray is an infected area or not, before extracting a tooth, a smear culture should be obtained from this tissue. This can best be done through the alveolar process. If the culture is sterile, it excludes the possibility of infecting pathology, and the tooth, although it be pulpless, cannot be considered to be the cause of a focal infection. Also certain organisms when present confirm a diagnosis in definite lesions, as the Vincent spirillum and fusiform bacillus in Vincent's disease, the *Treponema pallidum* in syphilitic sores, tubercle bacillus in tubercular lesions, Klebs-Loeffler bacillus, the pathogenic bacillus found in diphtheritic membranes, anthrax in anthrax, etc.

In examining the teeth, I have little to add to the voluminous literature on this subject, other than my technique which I shall demonstrate.

Before closing, I wish to state that in mouth diagnosis I am not unmindful of the many subjective symptoms, such as neuralgia, arthritis, etc., but the time will not permit of our going into this subject tonight.

A number of the lantern slides used in this paper were obtained through the courtesy of Dr. George M. McKee.

112 WEST 72D ST.

## Oral Surgery in the Army.

By Major B. LUCIEN BRUN, Baltimore, Md.

(Read before the Eastern Association of Graduates of the Angle School of Orthodontia, Baltimore, 1919.)

I CONSIDER it a great honor and distinction to have the privilege of addressing a few words to this society, but I feel keenly my inability to present a subject that will be original. That which I shall present tonight has already been thoroughly studied and discussed by men who have done the practical side of the work—those men who were the pioneers in the development of this special department of our work in the French Army.

At the beginning of our work in the A. E. F. before we were equipped to take care of the cases as we were at the time of the signing of the armistice or as we are today, as has been evidenced to you at Fort McHenry, we were greatly handicapped by lack of experience and the proper materials to handle the class of face and jaw cases that the recent war, with its high explosives, machine guns and shrapnel, caused.

Appreciating the wonderful results the French had obtained along these lines during the four years that they had been working to develop this branch of surgery, before our advent into the arena, it was but natural for us to turn to them, their methods and principles, and try in some way to imitate them, hoping that we in turn might be rewarded, if only in a small way, by results such as they were constantly attaining. The underlying principles that we followed were in many instances patterned after theirs and their literature was followed closely.

In the beginning of the war, the French dentist had a very difficult part

to play in that he had never been recognized by the French Army. This phase of the subject has been only recently mentioned in our city by one of the men who, I venture to say, together with Herpin, Pont and Frey have done more for our profession during this war than any other group of men; I refer to Dr. Villain. To go a step further, let me say that their difficulties did not cease with their finally obtaining a foothold in the French hospital and reconstruction areas, for in many instances they were confronted by another barrier almost as hard to surmount as the first, *i.e.*, a lack of co-operation from the surgeon.

This point I think most worthy of emphasis in that in such work there is an absolute need of perfect co-operation between the dental and surgical branches of the service. In the work by the celebrated Roy and Martinier along this line, there is set forth the general consideration of the treatment of war wounds of the jaw, and there is shown the importance of the rôle of the dentist in this treatment, which was at the time it was written in many instances left exclusively in the hands of the surgeon.

While I do appreciate the fact that you are not directly interested in this particular surgery, still in your work as in our work there is to my mind a very necessary need for absolute co-operation between the dentist and his medical and surgical brother if we are to attain our best results, and especially do I think that this applies to you as orthodontists.

Roy and Martinier remark that "with-



out a doubt there are a certain number of exceptions and we have been happy to meet many surgeons who thoroughly understand the importance of the rôle of the dentist and seek his valuable co-operation. It is to be emphatically stated that in a great many cases the general surgeon is little in favor of dental intervention in the rational treatment of fractures of the jaws. In many instances they have a tendency to minimize the rôle of the dentist in this treatment by the placing of a much delayed prosthetic piece, in order to remedy the vicious consolidations, the pseudo-arthroses, or mandibular deformations and facial deformations which are the consequences of inopportune or insufficient intervention. Then again there are others who recognize that the dentist is a necessary collaborator, but they insist that it is not necessary to ask for his collaboration until the injuries are healing and when all suppuration has disappeared.

I do not include such men as have had experience along these lines, for I know that they today appreciate the value of co-operation between the dentist and surgeon, but in civil practice I have talked with surgeons who do take these views, men who should appreciate the fact that certain underlying principles of surgery should be applied to the treatment of these cases the same as in bone surgery of other regions, the limbs in particular.

#### IMPORTANCE OF EARLY IMMOBILIZATION OF FRACTURES.

When a surgeon is in the presence of a comminutive fracture of the bone of a limb, his first consideration, after the hemostasis is made and the wound summarily cleaned, is to place the member as quickly as possible in such condition that the bony segments of the fracture will be coapted and immobilized in a normal position while the wound is draining, even to the definite delayed reparation of the torn or destroyed soft parts. He knows that if he waits to make that reduction and immobilization

until the wounds of the soft parts have completely healed and the suppuration completely checked, it will be absolutely impossible for him to then obtain a proper coaptation and that the tissues would consolidate in a vicious position. However, it is exactly that last method which is generally followed by many general surgeons in the treatment of mandibular fractures. They treat the cutaneous wounds without occupying themselves other than superficially with the broken bony fragments, even though their neglect very often results in considerably defective occlusion of the teeth and vicious consolidations, and it is only when these deformities have become more or less definite from an esthetic point of view or when the patient has become weakened due to lack of power of mastication that the surgeon asks for the co-operation of the dentist.

It is still by virtue of the same fundamental error that we have seen the surgeon suture a fractured maxilla, the base of which is open and bathed in pus, when he would never suture a comminutive fracture in a tibia bathed in pus.

It should then be conceded that the treatment of fractures of the jaws calls for a special technique which necessitates the absolutely indispensable collaboration of the surgeon and the dentist, and it is the respective rôles of the surgeon and dentist in war wounds of the jaws that we shall endeavor to clearly state.

#### I. IMMEDIATE CARE.

The wounds should be cleaned and treated by the surgeon which assures hemostasis and disposes of any free débris that may be present. The dentist is concerned more particularly in the cleaning of the teeth and the buccal cavity; his habit of working in the mouth makes this work easier for him than it would be for the surgeon. The fracture should then be immobilized in all possible cases and the fractured fragments held in place or returned to as nearly as possible correct position by the aid of such attachments as may be thought advisable, *i.e.*, arches, bands and ligatures



placed on the teeth following the usual procedures in orthodontia.

## II. RECENT FRACTURES OF THE JAW WITH MINOR INJURY OF THE SOFT PARTS.

The rôle of the surgeon in these cases is extremely small, being confined to the healing of the integuments and the elimination of the sequestrum. The task of the dentist on the contrary is very important. After cleaning the mouth and taking an impression of the jaws, he should construct a suitable splint upon the reconstructed model. If the case has not been allowed to remain too long before it reaches the dentist, one generally obtains a typical reduction. We would place in this class those cases which permit the placing of the fragments in such position that the result is obtained without any deformity and with perfect restoration of function. Such reduction and the result which follows are possible because of the dentist's technical knowledge and his familiarity with dental morphology and the peculiarities which present in the occlusion of the teeth of the two jaws.

## III. RECENT FRACTURES OF THE JAW WITH MAJOR DESTRUCTION OF SOFT PARTS AND SUBSTANCE.

Here the rôle of the surgeon is most important. It is his duty to first clean and treat the wounds, freeing them from débris. The dentist should be ready to take charge of the buccal cavity and of the teeth—an extremely important point—and very often healing is delayed owing to this having been neglected.

After some days' drainage, the wounds will present a more normal appearance and the shock from which the patient is often found suffering will be considerably less. It is then that the dentist's rôle is more active; it is necessary for him to make the reduction and place the fragments in good position, paying particular attention to the neighboring soft parts. In this manner secondary deviations are avoided and there is no danger of the fragments being displaced

by the retraction of the soft parts. The dentist should be allowed to assist at the earliest possible time, as the fragments which have been allowed to rest without notable displacement are soon found drawn by the healing retraction, and the typical reductions which were possible in the beginning are then impossible.

The fragments having been aligned with suitable appliances and the wounds being in good condition, the surgeon can readily make his sutures and later on, if there is room, the autoplasmic restorations of the destroyed soft parts. Where there are great gaps of lost structure, however, these surgical interventions should be preceded by the dentist placing in position a prosthetic skeleton, which being held firmly in good position will serve to sustain the sutured or restored soft parts.

## IV. OLD FRACTURES NOT CONSOLIDATED.

Unless a bone graft is to be attempted the surgeon has little to do in cases of this kind. The wounds are healed except sometimes for a persisting fistula: the fragments are as a rule considerably deviated; the occlusion of the remaining teeth is defective, and the face is often very badly deformed. Often in cases of this character surgical intervention will be found necessary to relieve contractions which might prevent the proper reductions of the fragments or the placing in position of the splint or appliance.

In the majority of cases, it is the dentist only who should intervene, his endeavor being to reduce the fragments by appropriate appliances. If the loss of substance is so extensive that the dentist is unable to obtain consolidation of the parts, then after the reduction of the fragments insert appropriate prosthetic appliances, if there be room after dilation of the healing tissues.

## V. OLD FRACTURES VICIOUSLY CONSOLIDATED.

Two alternatives are here presented; either the jaw is allowed to remain in position or an attempt is made to cor-

rect it by an osteotomy. In the first case, it is the dentist only who intervenes in an effort to remedy the condition, either by the extraction of some of the teeth or by the application of a prosthetic appliance which will restore mastication and esthetic effect in the best manner possible.

In the second case, if an osteotomy is decided upon involving a radical reduction of the jaw, intimate collaboration between the surgeon and dentist is necessary, the latter preparing in advance an appliance which will maintain in a reduced position the mandibular fragments which the surgeon is to separate. The operation performed, the dentist places and fixes in position the appliance

and after healing and consolidation have taken place, if there be room, he should insert appropriate appliances for restoration.

This is but a brief and hurried summary of some of the cases in which it is most important that there should be real co-operation between the surgeon and the dentist, and I am glad to say that the latter is now holding his place by the side of his big surgical brother. It is to be hoped that the experiences of the war will impress the importance of this collaboration between the surgeon and dentist in civil practice and place the surgeon and the dentist in even closer relationship than now exists.

827 PARK AVE.

### American Red Cross in Montenegro.



An American Red Cross dental car starting for a tour of the "Sunshine Mountains" in Lower Montenegro. The glaring light from the reflection of the sun on the white shale compels most foreigners to wear blue glasses. This dental team, composed of Captain Bruce Wolff of Boston, Miss Olivia Hamilton of Philadelphia, and Lieut. E. Ralph Adams of Lake Forest, Mich., has brought teeth comfort to hundreds of natives in the remote communities.

## CORRESPONDENCE

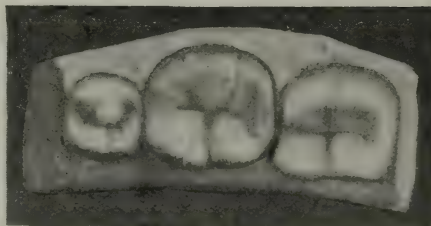
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### A Six-cusped First Molar.

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TO THE EDITOR OF THE DENTAL COSMOS:

Sir,—The accompanying illustration represents what seems to be a six-cusped right lower first molar. Within three years I have seen but two cases. In the previous one the cusps (sixth) were larger and alike present on both right and left sides. In the present case only the right first molar was six-cusped, the left had only five cusps.



Yours truly,

C. W. RATCHEFF, D.D.S.

CHICAGO, ILL.

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### "A Case of Necrosis of the Mandible."

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TO THE EDITOR OF THE DENTAL COSMOS:

Sir,—It is with no intent to cast any aspersion toward the contributor of the article appearing in your magazine for February, on page 226, under the title, "A Case of Necrosis of the Mandible," that I am prompted to make reply, but I do so simply in an effort to throw more light upon the question.

The distressing conditions of the case in question are said to have taken place, "as a result of the extraction of an abscessed molar tooth."

Now, suppose this tooth had not been extracted, and are we not to suppose that a necrotic condition existed before the tooth was extracted, and is it not pos-

sible that this necrotic condition could have advanced and reached the alarming proportions with the "abscessed tooth" *in situ*, just as well as after it was extracted?

Is it not just as reasonable to refuse to remove a small particle of wood, or steel from the end of the finger, which has remained there until pus has formed, as to refuse to remove an "abscessed tooth?"

May we not have expressions from a number of dentists in regard to this?

Yours very truly,

WALTER C. MILLER, D.D.S.

AUGUSTA, GA.



# PROCEEDINGS OF SOCIETIES

## Connecticut Dental Hygienists' Association.

**Fifth Annual Meeting, held at Bridgeport, Conn., May 23 and 24, 1919.**

### FRIDAY—*Afternoon Session.*

THE fifth annual meeting of the Connecticut Dental Hygienists' Association was held in the Stratfield Hotel, Bridgeport, Conn., Friday and Saturday, May 23 and 24, 1919.

The meeting was called to order at 3.45 o'clock, by the president, Miss A. K. Moores of Stamford.

THE PRESIDENT. We have a very interesting paper, which should be of particular interest to us. At present there are only three training schools for hygienists, one at the Forsyth Institute in Boston, one at the Rochester Dental Infirmary at Rochester, and one in Columbia University in New York. Today we are very fortunate in having with us Dr. ANNA V. HUGHES, director of the Forsyth Infirmary, and she will read to us a paper entitled, "Theory in Practice for the Dental Hygienist as Carried out at the Forsyth Training School."

Dr. Hughes has been director of the school ever since it was founded, and anything she may have to tell us will be most interesting, I am sure.

### **Theory in Practice for the Dental Hygienist as Carried out at the Forsyth Training School.**

By Dr. ANNA V. HUGHES,  
Director of the Training School for Dental Hygienists, Forsyth Dental Infirmary,  
Boston.

A short time ago we were honored and privileged to have Dr. Fones with us at

the Forsyth Infirmary. His talk and magnetic personality brought to us a message and a stimulus which we shall long remember. He told us of the remarkable work which is being accomplished in Bridgeport and I thought that you in turn might like to hear of the achievements of the Forsyth Dental Infirmary, particularly of "Theory in Practice for the Dental Hygienist" as carried out at the Forsyth Training School.

Forsyth Infirmary is of inestimable hygienic value to the rising generation of children of Boston and its vicinity. It is here that between two and three hundred children are treated daily, being taught besides, that a clean tooth never decays, that proper nourishment, thorough mastication and a clean mouth insure physical and mental development. And it is for the prophylactic work, of course, that we have the "Forsyth Dental Hygienists Training School," which offers unusual opportunities to the student of dental hygiene.

The facilities of the various clinics and laboratories of the infirmary are available and all of the girls receive thorough and comprehensive training which will fit them for three distinct types of positions:

*First.* They may be teachers in public schools and institutions.

*Secondly.* They may operate as dental hygienists in the prophylactic treatment of the teeth.

*Thirdly.* They may act as dental nurses in private offices and institutions.

Throughout the course theory and practice go hand in hand. The first

eight weeks are spent on the "dentech" models, lectures on instrumentation and prophylactic technique accompanying the work, and these are supplemented by courses in histology, anatomy, physiology, and dietetics, for it is the purpose of the course to give a broad understanding of the word "Hygiene."

The course in anatomy includes special anatomy of the head, teeth, and jaws as well as a dissecting course given at Tufts Medical. I have noticed that this latter course enthuses the girls very much, for as one of them said: "I never knew before how wonderfully we humans are made," and that is the very thought which we try to instill in the girls, for we know they will then intelligently teach others the care necessary for such wonderful mechanisms as ours.

Of course model technique alone for eight weeks would become very monotonous, so the girls are gradually introduced to the various clinics and departments in the infirmary.

The fundamentals in asepsis are taught now, preparatory to the actual work on the patient, and this experience is gained in the general sterilization room of the institution. Here the girls are taught the scrubbing, polishing, sorting and sterilizing of instruments and incidentally of course become familiar with dental instruments, which later helps them greatly if they choose office work as their particular branch.

You will doubtless be interested to know that the huge sterilizers of the infirmary hold one thousand individual trays of instruments and are electrically heated.

An interesting feature in the sterilization of the instruments is the process which is carried out with each tray preparatory to going into the sterilizer. As soon as a patient is dismissed the tray of instruments is sent to the sterilizing room where the instruments are taken from the tray, scrubbed, polished, sorted and the tray re-assembled. It is then placed on the truck ready to be put into the sterilizer. The instruments are kept at 325° (three hundred and twenty-five degrees) for three hours. Those not

sterilized by dry heat are boiled and placed in the trays just before they go to the operator by an assistant with sterile gloves, cap and gown and in a room where surgical asepsis is maintained.

The instruments that the dental hygienists use in the prophylactic work, however, are taken care of by themselves, so that they will know just how to do it in a dental office and likewise take care of the sterilizer. For them we have a sterilizer divided into individual numbered compartments and each hygienist has a container corresponding to her assigned number in the sterilizer, which holds her complete outfit of instruments. After boiling them for fifteen minutes the instruments are removed to a sterile tray, then dried with a sterile towel ready for use.

While learning these fundamentals in sterilization and asepsis, lectures in bacteriology, general pathology, and oral pathology with special reference to contagious, infectious and communicable diseases are given.

The social service department offers the students an opportunity to become familiar with the phase of work which later helps them in their school positions. But it is the oral hygiene room which really makes school work possible. Here a graduate hygienist is in charge, assisted at all times by a student hygienist. The principal purpose of this department is to follow up each individual child, with the result that over ninety-five per cent. of the cases receiving treatment are keeping their mouths and teeth in a clean condition.

Literature is hung on the walls of the room and each group of children on entering has a lecture given them illustrated with pictures. We find that their attention is more easily gained in this manner and a more lasting impression made. Then the children are talked to and questioned concerning their toothbrushes. Toothbrush drills are given during which the "very best" child may stand in front of the class.

It is a known fact that the first impressions of a subject are usually lasting. This is especially true in the case



of oral hygiene, as has been proved in the oral hygiene department of the Forsyth Dental Infirmary.

The majority of the children who visit this department come from the poorer families, where perhaps they have never heard of mouth hygiene or the important part a clean mouth plays in good health. In many instances these children do not possess toothbrushes, perhaps have never seen one used and they are entirely ignorant of the conditions existing in their mouths. These children are not to be censured or ridiculed but must be taught and inspired so that they may overcome the wrongs established through ignorance.

At the first visit the child is asked if he possesses a toothbrush; and if he does not, inquiry is made as to whether he can obtain five cents with which to purchase one. In all cases where the toothbrushes cannot be purchased they are furnished free by the infirmary. Then follow instructions as to when and how to brush the teeth and keep the mouth clean. The average child is glad to hear this and has a sense of pride which prompts him to do better. Short childish talks are given which serve to interest and inspire the child.

The part enjoyed most is the toothbrush drill. At home these beginners endeavor to give the drill to younger members of the family, thus often interesting the father and mother as well.

A supply of "clean tooth" buttons is kept on hand and one given to each child on his or her third successive visit with clean teeth. About four hundred of these buttons are given out each month with the understanding that should the child return at a later date with unclean teeth the button will be taken away from him. In fact, if the hygienist finds that the child is not co-operating with her and that on his third visit to the hygiene room he has still made no attempt to respond to her teachings, he is sent home, a note following in which the parents are notified that further treatment cannot be given unless the child does as he is told, and we are glad

to add that these cases usually return and co-operate most heartily with us.

While the instructions given are not always faithfully carried out the impressions are made, and gradually as the child grows older he will realize the importance of not only caring for his mouth but will tell others how to do so, thus spreading the gospel of a clean mouth.

In the extracting department the students have lectures and practical training in the preparation of novocain, care of the syringes, in the administering of general anesthetics, and the care of the patient before, during and after anesthesia administration.

Three days a week several of Boston's foremost specialists have clinics at the infirmary. Here again the girls assist and thereby gain a comprehensive understanding of neurology, orthopedic surgery, and of general and oral surgery, for they assist in operations on adenoids, tonsils, deviated septum, cleft palate, hare-lip, necrosis, osteomyelitis, and tumor of the jaw. Lectures are also given them by the various doctors who hold these clinics, in their particular branch.

In the surgical department the girls serve in the examining room, where all must come for advice as to whether or not an operation in adenoids and tonsils is necessary; in the etherizing room, in the wards caring for the patients before and after operating, and in the operating room itself where the girls assist the surgeon in charge as sterile and unsterile nurses. They also make and sterilize surgical supplies preparatory to operations.

In the dental clinic the girls act as assistants at the chair of the operator, adjusting the chair, arranging on the trays the necessary instruments and mixing filling materials such as cements and amalgams.

A course is given in dental research during which the girls have access to the research laboratory, and allied with this is chemistry and dental materia medica.

Observation in the X-ray department, followed by the placing of the film and



developing of the same, helps the girls later in office work, as does the experience they gain in the orthodontia department where they clean the teeth that are being regulated. Here again the observations are supplemented by lectures so that the dental hygienists may recognize the diagnostic signs of malocclusion in its earliest stages and call the attention of the parent to it, explaining the effects on the contour of the face and still more important on the health of the individual. In the plaster room they gain experience in taking impressions as well as having an opportunity to study the models afterward.

Then comes the clinical work in prophylaxis. From morning to night the girls are busy with patients. During three months of the year they have adults, the rest of the time children, and on an average the girls have seven or eight patients a day.

As the little patient approaches the chair the girls make a special endeavor to gain the confidence of the child, and usually by the time he is in the chair and the operation begins all signs of fear have disappeared.

While the patient is still in the chair the hygienist has a splendid opportunity to find out the manner in which the child is caring for his mouth, and any instructions missed in the oral hygiene department are sure to be brought to mind again. One way in which the child's interest is held is by having a small mirror always handy and showing him the appearance of his teeth before and after the treatment. The girls not only talk oral hygiene but endeavor to be a general teacher of hygiene in the broadest sense of the word, thus uplifting the standards of cleanliness and good health.

In addition to the work done in the various departments the girls are required to spend a specified time in the supply room, thereby familiarizing themselves with the different materials, drugs and supplies that would be found in a dental office. The knowledge gained is very beneficial to the girls, enabling them to better serve as assistants not

only after they take positions but also later on in the course when they act as assistants to the operators in the clinic.

We believe the hygienist is an educator. We believe that the time has come when, from a hygienic, educational and economic point of view, it is necessary that trained women go out to preach the importance of oral prophylaxis, and with this thought in mind we train our girls.

The PRESIDENT. It gives me great pleasure to present to you, Dr. H. J. Burkhart, Director of the Training School at the Rochester Institute, who will open the discussion on Dr. Hughes' paper.

#### DISCUSSION.

**Dr. H. J. Burkhart**, Rochester, N. Y. *Madam President, ladies and gentlemen,*—I am particularly interested in the paper which Dr. Hughes has just read. You probably all know that our system of instruction in Rochester differs considerably from that which is taught at the Forsyth Institute. We have tried to draw a very sharp line in this way. It is not our purpose and we would not be permitted under the law governing the practice of dental hygienists in the State of New York to turn out dental nurses to act as dental assistants. We have tried very hard to stick close to the letter of the law with reference to the training of young women for this very important work. There has existed a prejudice in the minds of many dentists, and a very large number of members of the dental profession are opposed to the dental nurse and to the dental hygienist, because they feel that in some way or other, they are likely to take business away from them. That is a very narrow view to take, and the profession in Rochester is alive to the situation at the present time. At first we met with considerable opposition on the part of the men who felt that money was going to be taken out of their pockets the moment women were turned out as dental hygienists; but since the work has been carried on in the schools, and the result of the work has been noted, there is very little opposition, and today the pro-

fession in Rochester is very much in favor of the course of instruction for young women, because instead of taking money out of their pockets it is very rapidly placing money in their pockets. I am not criticizing in any way the course as given at the Forsyth Institute, and I am not condemning the course there on account of our disagreement with it; but we have felt that this work is so new, and there is so much that we can all learn from one another, that it is very necessary, if we want to accomplish the greatest good, for us to have open minds with reference to the teaching in any institution. As I said at the outset, we have drawn the line very sharply, and we do not teach the young women to become assistants to dentists, except for the doing of the prophylactic work. We feel, first of all, that when a dentist wants an assistant for general office work, he wants an assistant trained along his particular lines, or in accordance with his particular ideas. It would be an impossibility for any educational institution to train young women that would suit every practicing dentist who wanted to employ one, and so we are trying to avoid the objection that might be raised on that account. We do not feel that young women should spend very much time in learning how to administer anesthetics. We do not feel they should spend much time in acting as assistants to oral surgeons, because the general field for hygienists is so broad, and there is so much necessary work to be done, that the time can be better spent in teaching them to do just the purely prophylactic work.

You probably are familiar with our law which says that no young woman and no dental hygienist shall remove tartar under the free margin of the gum; in other words, no attempt is made to teach these hygienists to be pyorrhea experts. We have tried very hard to impress that upon the minds of the young women, first of all so we will not have the criticism from the practicing dentists, and then we feel the course is so short that they could not properly be trained to do the work as it should be

done. The young women who have been graduated from our institution have given a splendid account of themselves wherever they have worked, just the same as the young women who have been graduated from the other institutions—from Dr. Fones' school, from the Forsyth Institute and from Columbia. They are making a place for themselves today and they are advertising the hygiene work as it could not be advertised in any other way.

Another pleasing feature about it is that they are splendid professional women, and I have yet to hear of a single complaint of unprofessional conduct on their part from a dentist or a public institution where they were employed.

I do not want to take the time to go into details with reference to our teaching, except to say that the forenoons, five days in the week, are given up to lectures, and the afternoons, five days in the week, from 1.30 to 3.30, are given to the practical work. The first four weeks of the course are spent in teaching the young women the handling of the instruments, the carving of teeth out of modeling compound, the filing of the natural teeth, the local dentists sending us their extracted teeth. They are taught to file those teeth and shape them, and know the composition of a tooth, and to know something of a tooth when they see it.

The technique work consists first of practicing upon these extracted teeth. At the end of four weeks they are sent under the supervision of a licensed dentist to the public schools. There they have perhaps one patient an afternoon for a month, and then gradually the number is increased to two and three and at the end of three months all their work is done in the public schools. I may say for your information that we do no prophylactic work in the dispensary except the cleaning of the teeth in the orthodontia department before the bands are set. All the prophylactic work is done in the public schools. Since last September, we have visited every public and parochial school and orphan asylum



in Rochester twice and the mouths of about 40,000 children have been cleaned twice since last September. That work is done by graduate hygienists and by licensed dentists sent out by the dispensary. We have out seven or eight squads at a time, five, six or seven in a squad. A portable outfit is used, and when the work is completed in a school the outfit is loaded on a truck and carried to another school. In that way we cleaned the teeth of the children in the public schools.

I am very pleased to say that hygienists not only from the Rochester institute, but also from the Forsyth and Dr. Fones' schools, are now working for the Government, and have given a splendid account of themselves. It is very gratifying to us that the Government considers this work of sufficient importance to employ these young women.

I want to pay a tribute, a very inadequate one, to Dr. Fones as the pioneer in this work. If he were not in the room, I might say some things about him that I will not say. His splendid work is known not only throughout the length and breadth of this land but throughout the world. I am happy to compliment at all times the work he has started here in Bridgeport, and the fine work that has been done in the Bridgeport schools, which is a model for all of us who have come after him.

I express the hope not only of myself, but of others who are engaged in this work, that some time Dr. Fones will have another school for dental hygienists in Bridgeport, and I am sure it will be a much better school than I am running in Rochester, because he knows more about dental hygiene than any man in the profession.

I wish to express the regret of the graduates of the School for Dental Hygienists of Rochester on account of their absence today. I expected until the last minute to have some representatives here, but for one reason or another no one seemed to be able to spare the time to come. The young women who were here last year came back with glowing accounts of the meeting, and told me

of the splendid things they saw here and the valuable things they brought back with them. I am very much pleased to be here, and am only sorry I cannot stay throughout your meeting.

The PRESIDENT. We are very fortunate in having with us in one afternoon the directors of the three training schools for hygienists, Dr. Hughes of the Forsyth Institute, Dr. Burkhart of the Rochester school, and Dr. Stevenson, of Columbia. We shall be very glad to have Dr. Stevenson continue the discussion.

Dr. A. H. Stevenson, New York City. I regret that I came in just at the last moment, and did not hear the beginning of the discussion, so I hope you will bear with me if I should repeat anything that was said by the preceding speaker. It is certainly a delight to see so many of the real earnest pioneers present. I trust and I know that every hygienist here feels that she is a pioneer in this work. Wherever she is working, she is being watched, and she is being looked upon as an example for others to follow.

There is so little divergence between the methods of teaching in the various schools at the present time, after all, that there is not much to be said for Columbia. I am free to confess that in Columbia University we have been proud to adopt some of the methods that Dr. Fones applied here in Bridgeport, especially in the practical work. We were very glad to teach the students at the beginning their practical work on manikins, and it so convinced us of the efficacy of that method of teaching, that we have adopted it for future teaching. A student who comes in to learn prophylaxis must of course know tooth form, but to familiarize herself with the posture she must assume when working on the mouth itself, there is nothing like the manikin, and it is but a slight step from that to the human mouth.

Many of you might wonder why in a city like New York, where the people think everything worth while is encompassed within the city limits, we should have to take second place in such an



undertaking as just described by Dr. Burkhart. We have almost a million school children in New York City, and I need not tell you how many of those children need the work that the hygienist can give; and yet at the present time, there is practically nothing done for those children by the municipality in the way of prophylactic work. We have dental clinics, but they are curative clinics, and the hygienists have not been utilized in this vast sphere. We are waiting patiently, and we are hoping some of the city fathers will have an inspiration some day, or that a Daniel will arise, such as you had in Bridgeport, who will hypnotize someone to give us an appropriation, that we may take up the work.

Notwithstanding the fact that we have not had the opportunity to do this work with the children, it has not deterred us from training hygienists. We are ready, if they are not, and if you will talk to any of the New York girls you will find them ready. We have laid tremendous stress not only on the teaching of the hygienist to do hygienic work, and the true meaning of prophylaxis; but an important part of the curriculum is devoted to training them in teaching mouth hygiene to children, and the reason that is emphasized so much in New York at the present time is because the dentists have not responded to the requests made upon them to give those talks in the schools. It is impossible to get dentists to leave their offices and go to the schools, or go in the evenings to mothers' meetings or clubs. They agree to do such work and do begin it, but we finally get disappointments and broken engagements, until by the end of the season no one cares to do it. The hygienists endure, and they do this work. At first many of them have felt diffident about addressing even audiences of children; but they are improving in that respect. Next year each one will be required to give so many talks before clubs or children's classes, and it will be counted a deficiency if she does not do it, because they are called upon to be propagandists. That word has brought

horrible thoughts to our minds during the recent war times, but now that peace is here, we can use it again. The hygienists know more about this work than the dentists, and while the average practitioner may be willing to give a talk, he is not equipped to give a talk as the hygienist is. In his office, the average dentist, strange to say,—perhaps I should not say the average dentist in Bridgeport, so I will say the average dentist in New York—is not able to talk and give individual instruction to his patient. If he had the time for it, he could not give a wash bowl demonstration, and only those who are specialists in prophylaxis or periodontia seem to be able to give the proper attention to this important part of the home care of the mouth. So when I make the statement that a hygienist is better able to do it, it is something that is true—in New York City, at any rate.

I did not come here to speak, but I came to learn. I feel my newness in this work, but I am very sincere and want to profit by the experience of all of you—even those who feel they are doing the least. I am very glad so many came from New York, because I know they will go away with an inspiration that they have not received in New York, and New York will profit as a result.

The PRESIDENT. One of the very best friends the dental hygienists have had from the very beginning is Dr. E. C. Kirk of Philadelphia, the former Dean of the Dental Department of the University of Pennsylvania. From the very outset he has been very helpful, and a very great friend to all the hygienists. He is with us this afternoon. He has been in England for a good part of the winter, and we are very glad to have him with us, and to hear from him today.

Dr. E. C. Kirk, Philadelphia. I want to thank you for the courtesy of your invitation to come here. Dr. Fones asked me if I would speak today, and I said the difficulty was not in getting me to speak, but to get me to stop speaking, though I really have not very much to

say in the technical sense. You know a great deal more about it than I do, but I am tremendously interested in the subject, and if that is a justification I want to say just a few words about it. Dr. Fones told me not to say anything about England, but I want to say just one thing. I happened to be dining in London with a group of very eminent dental practitioners, and during the evening we heard of the death of Dr. George Cunningham, one of the pioneers of the dental hygiene movement in England, who instituted what is known as the "Cambridge experiment," to test out the value of oral hygiene in the public schools of Cambridge. Before this experiment was made, an investigation and examination of the mouths of school children was very carefully made—by dental specialists, not by physicians, for physicians do not know how to intelligently examine a mouth for dental defects—and the prevalence of caries among children was found to be on a level with that of children in other parts of the world, ranging from 92 per cent. to 96 per cent. of mouths that contained one or more carious teeth, principally more. Let us say there were about 5 per cent. or 6 per cent. of sound dentures among the school children of Cambridge.

Then the oral hygiene work was begun in the schools, and the children who entered the schools at that time have now reached the leaving period, and the statistics show over 80 per cent. of sound dentures—a result that is a practical demonstration of the soundness of this movement in which we are all interested.

The impression I gain from contact with this problem in England, and in America, and in France, is that the world is awakening to the need of oral hygiene. I had a letter only a few days ago from the Commissioner of Health of Pennsylvania. I had written to him to learn his attitude toward oral hygiene. His letter came back, saying in effect: "I have been trying to find some means by which we could extend this service to the school children of Pennsylvania. I have long been committed to the idea that the prevention of disease should

start at the beginning of the alimentary canal."

In connection with the activity of interest which is manifest everywhere in the civilized world in this problem, there comes to me that oft-quoted statement that Charles Mayo made in Chicago some years ago, when we first began to recognize the significance of focal infections and pyorrhea. He said he believed the next great step in medical progress along the lines of preventive medicine should be made by the dentists. Will they do it?

Oral hygiene is that "next great step in medical progress along the lines of preventive medicine" and the same question applies to this oral hygiene matter. Shall we rise intelligently to the occasion and take the step? As a matter of course there arises the question of the educational steps leading to it. Dr. Hughes has told us what is being done at the Forsyth Institute, representing their conception of what the oral hygienist ought to know in order to be equipped for her work. Dr. Burkhart has presented the side of the Rochester Infirmary. I am rather inclined to favor Dr. Burkhart's side. I believe the problem of education for the dental hygienist is strictly analagous to the same question as between the dentist and the medical man. How shall we educate the dentist? There were two angles of view that created two cults, one that held to the axiom that dentistry is a specialty of medicine, and the education of the dentist should begin in the medical school, and he should pursue the entire medical curriculum, and having done that, he should take up the special study of dentistry. The other view was that we should educate the dentist for his work, taking his range of practice as an ideal, and shape his education to that ideal from the beginning, arranging his educational curriculum accordingly. It is coming to be more and more the belief that the latter principle of education is rational and sound, but of course it all depends upon one's definition of what constitutes a dentist. What is to be his sphere, and how far afield in medicine



is he to go? The analogous problem is presented in the case of the dental hygienist. If we are going to educate an office assistant, one conversant with all the work of the dentist, or the oral surgeon, and qualified to act as a qualified assistant all the way through, it seems to me that is a difficult question.

It seems to me that the curriculum the hygiene novitiates are required to pursue under the Forsyth plan would, if made only a little more comprehensive, enable them to graduate with the D.D.S. There is often the tendency to make these things diffuse. My argument is, we should make technical education intensive. These hygienists should be experts in their calling. I admit the great desirability of their knowing everything they can—there are many more things that would be useful to them; but I believe that this educational work should be intensive, and not diffuse.

Dr. Stevenson made a very happy suggestion. He spoke of this Daniel that rose up in Bridgeport. I do not know whether he will forgive me or not for divulging what I regard as the secret of his success, but we ought to have that secret now, he has monopolized it too long. Oral hygiene has become a public necessity. As I analyze it, it happened that Dr. Fones became imbued with the importance of this thing, and he said: "I am going to put it through." He did not at the beginning, as I understand it, ask the city fathers for an appropriation, but he began to create dental hygienists and set them to work. It is a very peculiar thing in human psychology that many of the luxuries, in the course of time, become necessities. It was so with the electric light, the telephone, and the automobile, but these things are now considered necessities. Dr. Fones has now made the dental hygienist a public necessity.

The practical result of all this is that, after the public realizes that it is a good thing to have oral hygiene in the schools, and the hygienists have demonstrated their right to live and be the thing they strive to be, have demonstrated that they are a necessity, they will undoubtedly

command the necessary financial backing. You are yourselves causing the taxpayer and the voter, who send their children to the public schools, to make the demand that is sure to result in the funds needed to finance the movement being provided.

I believe it is the appreciation of that point of view and the tremendous enthusiasm of this pioneer activity in Bridgeport that have set this movement going as it is throughout the United States of America.

The PRESIDENT. We always feel no meeting of the hygienists is complete until Dr. Fones says something to us, and we will be happy to hear from him now.

Dr. A. C. Fones, Bridgeport. There is an old saying that the pulpit preaches what the pews dictate. I feel in regard to Dr. Hughes' presentation today, that they are doing in Forsyth just what the demand has been, and is now, for the hygienists in Boston; and I am in sympathy with all they are doing there, because they are doing splendid work. I do feel, however, that the time is pretty near ripe when this course should be standardized somewhat by those who are familiar with the education of the hygienist, because the demand for hygienists is spreading throughout the United States. We are receiving letters constantly from various centers where they wish to establish schools, and they are asking what shall be the curriculum and the scope of the hygienist, and what is her field of endeavor? I think, therefore, the sooner there can be outlined some definite course of procedure, the better it will be for this great effort we are making—the prevention of dental caries.

I know that in each city and each center where the schools form, those in charge will have their own ideas of what this field of service shall be, and it will be very difficult to change their ideas; but at the beginning of this course for the dental hygienist it was our conception that she should be a worker for the prevention of disease. The term orig-



inally was "the dental nurse" but in my analysis of the field of service or endeavor in which we wanted to launch these women to do so much for humanity, I felt the one thing she was not to do was to treat disease, but to fight against disease. She was to be a means for the prevention of dental caries, and a teacher of hygiene. In my announcement of 1913 that was placed in the notice, that it was to be our endeavor to teach these women to be hygienists, and they were to be known as dental hygienists.

I agree with Dr. Kirk that you cannot have too extensive a course, or know too much. The salvation of the world is hinged on one word—education. The more you know, the more you will keep out of trouble, and that is the one thing the corps in the public schools are doing—endeavoring to prevent physical defects by teaching hygiene.

It is my hope that the courses as they are being established now throughout the country, shall be planned with the view that these women shall be known as general hygienists, and that mouth hygienists make for the most important part of general health—in the prevention of disease.

I was interested in Dr. Burkhart's remarks regarding the practical teaching of the hygienist. It is very possible they have there a plan whereby these women in the public schools receive some detailed instruction while doing that work under the jurisdiction of the teacher; but I cannot quite grasp how one can learn the technique of instrumentation and polishing, unless it is taught step by step, such as is presented by the use of the manikin. It seems to me it is too intricate and too difficult to learn in all its various conditions, excepting by individual lessons and instruction from one tooth to another—the holding of the instrument, the fulcrum point, and the handling of the instrument to secure the delicate technique one should acquire. It seems to me the manikin is a necessity, and I feel that in our schools for the dental hygienist, the manikin should be adopted.

I have just received a letter from Dr. Oliver of Nashville, Tenn. They are planning a course for the Vanderbilt University for the fall. Dr. Bunting is starting a course in Ann Arbor. There is one in Iowa City, by Dr. Breen. There is one in the University of Colorado, and in California; and I understand that Illinois and Indiana both have laws under consideration before their legislatures. I just received word of the passing of a law in Oklahoma, and also that Minnesota is interested. Altogether, fourteen states have such laws now, or have them before their legislatures. It is therefore necessary that we should give the course for the dental hygienist serious consideration. What shall be her sphere, and what shall she be trained for? What shall be the requirements for entrance into the school? In the Forsyth Institute, I understand no young lady is eligible unless she is a graduate of a high school. I believe in Rochester she must have one year in high school, and I believe the same is true of Columbia. Dentistry did not start by requiring the men who entered dental schools to be college graduates. We must have zero for the starting line. There must be a scratch line where the race begins. You must creep before you walk, and you must walk before you can run. You must create the demand for the hygienist. We could turn out 1000 hygienists, and if there were no demand, they would not secure positions. There are many young women who are grammar school graduates, or have had one year in the high school, who are employed as dental assistants in offices, who are intelligent women and perfectly capable of becoming excellent hygienists, and who would be excluded in this movement for education as hygienists, because they are not graduates of a high school. I think we must eventually make that the requisite, but I believe for the first few years we should be lenient on that side of the question. You can have that course just as stringent and difficult as you wish, and if she cannot keep up to it, she will drop out; but give her a chance to get in, to prove

if she has the stuff in her to go on with the course. I know of many girls who are assistants in offices, who would make splendid hygienists, and are keen to educate themselves to be hygienists, and I think those girls should be allowed to take such a course, and prove that they are fitted for it. In Connecticut we need fifty at the present time. The Boston girls would much prefer to be in Boston, and the New York girls in New York. It is true these various schools have applicants and students from the western and other states, but I do not doubt that most of the students in the Rochester school are Rochester girls, or live fairly close to it.

You can see, therefore, it is necessary that we have some standardized course, and that the field of the hygienist should be known. I think she should be an educator and a teacher of hygiene, and I think the prophylactic part of it is but a third of it. She must be an expert operator, and an expert teacher, to be a real hygienist. When our State boards of education realize that these women are absolutely essential, there will possibly be courses established even in the normal schools, so they may be hygienists in the true sense of the word.

**Dr. Hughes** (in closing). I am very much interested to hear the different views of the different schools. I feel I am perhaps on the other side of the fence, but on the right side just the same! I think the question of requirements is very important, but we have never had any one graduate unless she had a high school diploma to show. I agree with Dr. Fones that there are many who are well qualified to enter and do the work, more so perhaps than a high school girl, and who have not had a chance in times gone by to have a high school education; but there are so many at the present time who have the high school education. Even the poorest families plan for a high school education for their boys and girls, at least it is so in Boston. We could have in Boston much larger classes, if we wished. We had the first year a class of thirteen, and turned away about sixty. Some of the

girls went to Columbia, but we could not take them because they had no high school education. We do not seek large classes, because we feel we can afford to wait.

The requirements for all schools and colleges of course are going up, and we feel it is well to keep pace with the others, the medical and dental schools. I feel we are going to get better girls right along. It may keep things at a standstill for a few years, but there will be no trouble in getting high school graduates, because they are coming right along. We have to refuse many. As a rule they are women who had to go to work when they did not expect to.

We can talk over the matter, of course, and if there is any agreement we can come to, I shall be very glad. I feel we give them a splendid course. I am amused to hear men say we cannot give too much, and yet they do not give them as much as we do. We give them an eight months' course. By regulating that, and placing them in the different sections, they can get the course we give. It is very helpful in any place they might be in, whether in an office, or a school, or anywhere. The girls that are trained in doing surgical work are a great help.

As for preventing disease, I think experience with nose and throat work is a great help. When they come in contact with the children in schools, and find they cannot breathe through the mouth, they can easily detect the adenoids and tonsils, and advise the parents what is necessary. It is like the dentist. When we go to college, we take up many things we do not need. We must do it. They cannot put us in the infirmary and teach us just the things we will do when we get outside; but the more we learn, the better.

I notice many of our dentists are good oral surgeons, and I notice many of them are the envy of the men who patronize them, because they know not only dentistry, but medicine as well. I feel we do give them a splendid course, even if I am alone in my stand.

Adjourned to 8 o'clock P.M.



FRIDAY—*Evening Session.*

The evening session was preceded by a banquet, which was served in the main dining-room of the Hotel Stratfield.

The president, Miss A. K. Moores of Stamford, introduced Dr. Kirk, and asked him to speak of his experiences abroad.

Dr. E. C. KIRK, Philadelphia, Pa.

The most interesting thing, from our special point of view, is what has happened in England recently, in making dental service an organic part of the public health service of Great Britain. For reasons not necessary to go into in detail, but in general, I believe it has come about as an outgrowth of the local restrictions placed around the practice of dentistry by the act known as the "Dental Act of 1878," as a result of which only about 5000 dentists have legally qualified in Great Britain for the practice of dentistry. That is the number of legally qualified dentists Great Britain has had, to deal with the dental health problems of 40,000,000 people. To meet the need there has grown up outside of the legitimate dental profession, a group of practitioners, some of whom may have been professionally qualified, but were not legally qualified. By the same token, there are many people, both men and women, attempting to practice dentistry, who have previously been house servants, butlers, artisans, quacks and mountebanks. When the war came on, Britain had only 5000 qualified dental surgeons to draw on for service upon the military side. They even began to enlist the legitimate dentists as soldiers, and then a cry went up from the civil side—"We have not enough dentists here to take care of the civilian needs." The Government was then brought face to face with the fact that the dental service in Great Britain was totally inadequate. The military dental service fell down, broadly speaking. The allotment was about one dentist to 180,000 soldiers. You know what would happen if each of you, as a dental hygienist, had 180,000 mouths to look

after. It was a service only in name, but it brought definitely to the attention of the Government the fact that reform was needed. When they get ready to do things over there, they do them on a magnificent scale. They did not go to the dental profession to solve the question, but a Royal Commission was appointed, under the mandate of the King, which was charged with the duty of looking into the situation, and reporting upon British dental conditions, to account for the shortage of dentists, and to suggest means for securing a larger service to the British public.

That commission has completed its report, and it is an amazing document. When we study it carefully, and its recommendations become generally known, and it is realized what it will mean for the improvement of dental conditions in Great Britain, and particularly that it means the official recognition by the National Government of oral hygiene as a factor in the public health, to be developed and applied from the standpoint of public health service; it will be recognized as the first instance on record of a nation, as a nation, taking such an important step.

I went around London considerably, and saw the dental work that was being done by direction of the London County Council in extending hygiene service to the poor of London. There are some twenty or thirty public clinics in London that are rendering health service at various stations throughout London on the oral hygiene side; their dental staff are oral hygiene propagandists as well, for it is a part of the health service which is attached to each of those stations. Each station is served by a group of specialists, who give treatment to children for minor ills, who do not need to be sent to a physician for their ailment. They are mostly in the charge of women—and very bright women, too.

It is intended to extend that type of service so that it will be available throughout Britain. I found members of the medical profession tremendously interested in the oral hygiene propaganda. England has appropriated dur-



ing the war out of her already depleted treasury, I have forgotten how many millions of pounds for educational and health purposes. She is keenly alive to the fact that the salvation of the nation depends on the physical efficiency of its units; and to secure that, she realizes that she must begin in the kindergarten the care of the physical side of the children, that their education and their mentality depend on the old principle of a sound mind in a sound body; and the teeth in this connection are as important as any other factor.

This old British world, which we have at times regarded as a little bit stodgy and slower than ourselves, has wakened up, and is doing great things. America is after all the source, the origin, of many of the biggest things in dentistry. Whether this thing that England is doing is original or not is unimportant, what is important is that it is on a scale of magnitude that far surpasses anything that has ever been done before; and the step she has taken, of making oral hygiene a part of the national health problem, is an advance ahead of anything that any other nation has yet done. So we must look to our laurels. France is waking up to the same thing. They do not have in France any unregistered practitioners, and the standard is in some respects better there but the service is inadequate to the needs of the nation. To stem the tide of destruction of the dental organs, and to make a large and positive contribution to the higher health efficiency of the whole nation, constitutes the work in which you people in common with the dental profession are enlisted.

I had a little tête-a-tête with your president during the banquet, and I said some things very feelingly about what women have accomplished in this war. I went so far as to say if it had not been for the women there would not have been any war. (Laughter.) It depends on how you take this, but our boys fought for the thing that womanhood stands for. They called it patriotism, love of country, of home, but what is home but the materialization of the

spirit of womanhood? They have already accomplished much. They own now about seven-eighths of the earth, or maybe more. They have subdued and tamed, so that he will feed out of the hand, that product of creation that has been called the sturdy male vessel. He does whatever they ask him to. He even dies for them, and dies willingly.

Therefore I feel that with the start you have made, and the progress you have developed as champions of the oral hygiene movement, that after all—and I say it with all due respect for what the great Bridgeport Daniel has accomplished (that is what he was called today)—after all, it is up to you women. You have gotten prohibition, and woman's suffrage, but if you go any further and attempt to take from us our after-dinner coffee, I must emigrate to where they do things as we once did in those good old degenerate days of male domination. If you will only get your heads and minds together in the right direction, you will, as surely as the night follows the day, bring this hygiene movement where it belongs—to a successful issue. I do not know anything that you can do that will make more for the health of the people, and I say it with due regard for what Medicine (I always spell medicine with a capital M) is accomplishing. There are many things outside of the focal infection question relating to the teeth, for instance, malposition of the teeth, which wreck the nervous system of children, that will need your attention; but when I think of what can be accomplished by you women, I cannot help believing that you will in due course be considered among the great benefactors of the world.

The PRESIDENT. Dr. Kirk makes us all feel very responsible, but he has made us see England's side more clearly than most of us perhaps have done. We thank Dr. Kirk for giving us such an interesting talk, as well as for the interesting talk he gave us this afternoon.

We will now adjourn to the meeting room, where we are to hear from Professor Winslow.

After calling the meeting to order, the president introduced the speaker.

It is my great pleasure and privilege to present to you Prof. C. A. WINSLOW, who really needs no introduction, as his fame is nation wide. He is at present Professor of Preventive Medicine at Yale University, and he has probably done more toward organizing public health work than any other one person. His subject tonight "The Control of Germ Diseases" should be very interesting and helpful to us as hygienists. He has always been very much in sympathy with us, and I am sure we shall all enjoy what he has to tell us.

### **Germ Diseases and Methods for Their Control.**

By Prof. C.-E. A. WINSLOW, Yale University, New Haven, Conn.

I had planned to speak to you tonight in regard to germ diseases and methods for their control. I am going to do that briefly, and then take up one or two wider questions suggested by Dr. Kirk's talk. I need not dwell long with a group that has mastered Dr. Fones' book on the curious phenomena of communicable diseases—the strange kind of thing that suddenly happens to a person who is apparently perfectly well, and in a few hours is stricken down and becomes so debilitated and weak that he is unable to lift a hand. You all remember the epidemic of influenza that swept over us last year, and the destruction it wrought.

In one of the old medical books there is the description of how one should protect himself against one of these germ diseases—Asiatic cholera, and I will read it to you:

About his body first a layer of India rubber, thereupon a large pitch plaster, on top of this a bandage of six yards of flannel. On the pit of his stomach a copper plate, on the chest a large bag of warm sand. Around the neck a double bandage filled with juniper berries and grains of pepper; in the ears two pieces of cotton wool with camphor; hung on the nose a smelling bottle containing vinegar, and in the mouth a twig of sweet calamus. Over the bandages a shirt soaked

in chlorid of lime, over that a cotton wool jacket and a hot brick, and, finally, a vest sprinkled with chlorid of lime. He must wear flannel stockings next the skin, underwear boiled in vinegar, and, on top of these, woolen stockings infiltrated with camphor. For shoes two copper vessels partly filled with hot water, and overshoes on top. Attached to the calves of the legs are two flasks of water. He wears a large woolen overcoat sprinkled with chlorid of lime, then a mantle made of oilcloth and a hat of the same. In his right pocket he carries one pound of balm-mint tea, a half-pound of earlyme thistle and a half-pound of sage. In his vest pocket he carries a bottle containing camomile oil and in his trousers pocket a bottle of camphor. On his hat he balances a tureen of thick gruel, in his right hand he carries a shrub of juniper, and in his left hand an acacia branch. Strapped to his body is a small wagon which he pulls after him and in which there are fifteen yards of flannel, a boiling kettle, ten scrubbing brushes, eighteen bricks, two hides and a comfort stool. He must wear a mask made of curly-mint paste and keep a quarter of a pound of calamus in his mouth.

Those were the early methods of preventive medicine and some of the same ideas are still with us. They told me in Hartford last fall that all the camphor in the drug stores had been sold out on account of the epidemic of influenza.

They are putting on a play now in Paris, called "Pasteur,"—simply scenes in his life, no imaginary drama, or story, simply scenes showing him with his first vaccine, debating in the Academy and so on,—and the audience is held spell-bound. It was Pasteur who showed us that these communicable diseases were due to germs, which get into the body and poison it just as mold gets into a jar of jelly. He taught us that they were due to specific kinds of germs, which are different from the germs which occur in the water and in the earth. Gradually it became clear that there were only certain kinds of germs that could grow in the human body, and that these kinds would not grow easily anywhere else. They were *parasites*, a word which comes to us from the time of the Greeks, and which meant originally not a microbe, but a human



being. It meant the hanger-on at the great man's house, the dependent who did odd jobs and amused his master and got his living at the expense of the great man. Just as that human parasite had probably lost the ability to earn an honest living in the world outside, so these microbes, which live upon the human body, do not live long in water, or in air, or anywhere outside of the human body. This conception has tended to revolutionize our ideas in regard to the control of germ diseases.

The original tendency was to look outside for the causes of disease, to lay the blame on the swamps, and the night air, and all sorts of external things. Gradually it was forced upon us that it was not in these outside things, but in the bodies of human beings themselves, that the danger lay. The danger lies in the transfer of bodily discharges from one human being to another, and the transfer must be a rather quick one, if the germ is to be kept alive and virulent.

Then came the recognition of a new type of human being besides the sick person who might be dangerous—the carrier. In a great many of those diseases, it was possible for the germ to live in the body of an individual without doing any harm, but capable after transfer to another person, of producing active disease. Our object today, therefore, is to prevent the passage of discharges from one person to another, whether the first person be ill or well, because even if a person is well, he may be a carrier of the germs of transmissible disease.

The vehicles by which disease germs pass from one person to another may be divided conveniently into three great classes—food, fingers and flies; food, including water and milk, flies including all sorts of insects, and fingers including direct contact.

Some diseases are easy to handle, and others not. We know now, for example, that bubonic plague may be controlled. This disease broke out the last time in 1894, and spread to seaports all over the world, from Australia to New Orleans, to Scotland, and San Francisco; yet in no place, except in India, did it gain a foothold, because we knew it

spread from rats to men by the bite of a flea, and we were enabled to control it by a systematic campaign against the rat.

The particular pest of armies in every war all through history has been typhus fever. In the Japanese-Russian war there was a great outbreak. Typhus decimated Napoleon's army, and it was typhus that saved Constantinople from its enemies in the Balkan war. Now we know the disease is spread by the bite of the louse and that it is easily and effectively controlled.

You know the story of yellow fever: how in 1898 when the American army of occupation went into Cuba, they found there had been 750 deaths a year from yellow fever in the city of Havana. They could not do anything to control this pestilence at first. You remember those four Americans, Reed, Carroll, Lazear and Agramonte, how they experimented upon themselves, and proved that yellow fever was caused by the bite of a particular mosquito. Carroll came down first, and then Lazear who gave his life to the cause. One of the grandest things in the history of medicine was this calm facing of death from a terrible disease.

In March 1901 Reed and his colleagues solved their problem, and the scourge of centuries was practically wiped out in a year. So, one-by-one, the insect-borne diseases have been practically brought under control.

We do not have today any great epidemics of food-borne diseases since milk has been pasteurized and water purified. We can eliminate lice and mosquitoes, and we can purify water and pasteurize milk, but we cannot pasteurize people, and they are the source of danger in contact-borne diseases. They remain the great causes of diphtheria and measles and pneumonia and influenza and diseases of that type. Material from one person's mouth gets into another person's mouth, that is the way these diseases spread. It is not pleasant, but it is so, and that is the fundamental thing you must remember in all these cases of colds and sore throat and pneumonia and kindred diseases.

In dealing with these contact-borne



diseases in times past there was a quarantine at the State boundaries called "shot-gun quarantine." The States adjoining would plant men with shot-guns to prevent people from crossing the border. We saw something like that in the paralysis epidemic. This old method of quarantine was not very effective and it interfered with commerce and travel. Newer methods have now come into vogue—methods which we group under the heading of isolation. Quarantine is a rough method applied to groups of people. Isolation is applied to the particular individuals who are considered dangerous. A few years ago, for instance, a number of cases of cholera were brought into America when there was an epidemic in Italy, and the ships were actually detained only for two or three days while bacteriologists examined the discharges of each person to determine whether he was a carrier or not. Then they isolated the carriers, and let the others go. Isolation is much less irksome and burdensome than quarantine, and it has been very successful in many cases. It must, however, include the carrier as well as the actual cases. Cerebro-spinal meningitis, for instance, is one of the serious diseases of military life, and when it breaks out all the men's throats are cultured, and those who are carriers of the dreaded germ of cerebro-spinal meningitis detected and isolated.

There are many diseases, however, in which we cannot make isolation. Take measles, for instance. Measles is most contagious in the early stages when it cannot be recognized as measles at all, and when it is considered as only cold in the head. Yet it is actually more dangerous at this stage than when the rash appears. It is difficult to deal with problems of that kind.

Again take infantile paralysis. The trouble there is of a somewhat different nature. This disease is spread mainly by well carriers. In cerebro-spinal meningitis we can pick out the carriers, but in infant paralysis we cannot pick them out, because the germ concerned can only be isolated by the use of monkeys which cannot be obtained in any

number. This is a sufficiently professional gathering for me to confess openly that none of the things that any of the health departments did about infant paralysis did the least bit of good. They had to go through the motions and do the best they could; but it did not affect the prevalence of the disease in the least degree. As far as prevention goes, we cannot do anything with infant paralysis, because it is spread by well carriers, and we cannot detect those carriers.

With influenza the case is still more hopeless. We know almost nothing about this disease. We do not know how it is spread, or how to detect it in the dangerous stage. There is only one thing that helped—absolute quarantine. Institutions that were kept shut up tight were immune for a time, but the disease usually got in after a while when the quarantine was relaxed. In one institution in Connecticut they escaped it entirely while the city all about was suffering, until early in January some children were sent down to the post office, and then they caught it, and about 400 children in that institution came down with influenza.

There were marked differences in the number of deaths in different cities. Cities that were in generally good condition came off easily. Those that had all sorts of other diseases suffered severely. That was all one could say about it.

There are certain groups of diseases that have been completely conquered by sanitation; but about diseases like influenza and infant paralysis we have not enough information as yet. Then there are the diseases with which you deal, the sub-acute infections and focal infections. They are not directly traceable to infection from one person to another. They may be communicable, but slowly, as tuberculosis, not in an acute, definite form.

There is obviously little that the health authorities can do directly in dealing with the contact-borne diseases. The only way to handle them is by education, by changing the habits of the individual, personal education must take the place

of police procedure. If we can make people understand that all these diseases come from getting into the mouth something filthy that has come from the mouth of someone else, we can do a great deal. We must acquire the aseptic sense, the instinct that keeps out of the mouth things that are not clean, in place of the normal instinct to put everything into the mouth, the instinct with which babies are born, or else are endowed soon after they are born.

The health officer, as a health officer, standing up in his might and issuing orders, serves a useful function; but he has done all he can. Now he must get down off his platform and talk to people individually, and try to change their habits. He cannot quarantine the early cases of disease, because he cannot recognize them. It is only the individual father, or mother, or teacher, or companion in the home or the factory, who can recognize these acute communicable diseases in their very early stage. So in your field you must educate the people and train them to have their teeth cleaned and get the proper care they require. That is simply symptomatic of the greatly widening scope of education in the field of public health.

The health officer of today ought to be a man who thinks in statistical terms. He does not ask, Is such and such a thing dangerous? The private physician deals with one individual at a time, and he has to do everything he can for that individual. The health officer has a whole community to deal with, and a limited amount of money; and he must say, "How many lives can I save for a dollar?" He sees that some of the things, like cleaning up the backyards and supervising the food stores, are not really going to save a great many lives. He sees that the control of communicable diseases, particularly tuberculosis and infant mortality and venereal diseases are three of the great profitable lines of undertaking. Take tuberculosis, still accounting for one-quarter of all deaths in young adult life. We can deal with that partly by attending to the surroundings, by protecting men from bad

environments, such as the dusty atmosphere of grinding shops, but we must work mainly by education in hygiene. The main thing is to change the people's daily habits of living.

Infant mortality is the greatest single line of activity we can pursue from the standpoint of results. The infant mortality rate is calculated as so many deaths under one year of age in proportion to 1000 births. In Russia before the war there were 250 deaths per thousand births. In the United States, the figure is a little over 100,—I think 120. In New Zealand it is 50. Only one baby in 20 in New Zealand dies before it reaches its first birthday, and that is the direct result of the work of infant welfare stations.

So the campaign against venereal diseases is partly a problem of providing clinics and treatment; but mainly an educational campaign.

Then take the great field of mental hygiene. We have heard a good deal about the war psychosis, commonly called shell shock, but it has nothing to do with shells. There are some people always well balanced to meet any situation. Others are excitable and flustered and worried, and things go hard with them; there is a different degree of balance and co-ordination. Whether a person can get along in a community or not is a measure of the balance of his mental equipment. In war a certain number who would have remained normal have been pushed over the line by overstrain, that is merely what war psychosis means. England and Canada did little about it. There are thousands and thousands of their men blind and disabled as a result. When America entered the war a little group of people in New York went right to Washington and persuaded the Surgeon-General to organize a force to deal with the question. Of about 10,000 cases of war neurosis, how many do you think were found who cannot be helped? Not more than one hundred. This wonderful result was achieved by mental first aid, by the efforts of a force of psychiatrists who treated these cases in the beginning, and



prevented them from developing further.

There are cases of that kind in peace, just the same as in war. I heard this afternoon of such a case—the man happens to be a returning soldier, but his trouble only developed lately. There are people in every large city in Connecticut who are acting a little bit queerly and getting out of touch; they say people do not like them, and everything is going wrong and they are beginning to be obsessed by one idea or another. That was just the position of those men who came out of the trenches. These people, if taken care of, will come out all right, but if they do not receive proper treatment at the beginning, the trouble will progress until some day the victim will kill somebody with an axe.

We turn almost wholly to women for the actual work of individual health education, I suppose because this kind of teaching requires patience and tact, and those are not particularly masculine qualities. We turn first of all to the nurses, and in many of these fields the public health nurse has become the central figure in the whole movement. We are trusting her to "carry the message to Garcia," to get the knowledge of the laws of health into the lives of the people who need it. The social worker, the psychiatric social worker—all kinds of helpers, are being trained. We must give Dr. Fones the credit for this great movement here in Bridgeport, and for starting this new profession of dental hygiene which makes such a fine showing on its fifth anniversary. You are a particularly successful and valuable addition in this great force that we are sending out to cope with the problem of ignorance as a factor in disease.

Nothing we are doing is comparable to what we shall do. Think of the amount of money spent in training children's minds, and of the slight attention paid to the health of their bodies.

The physician has today no chance to treat most diseases in the early stages when they are most readily curable. He does not even know what their early stages are like. Someone said of a recent book on hardening of the arteries, that it

read like the third volume of a three-volume novel.

We ought not to be building hospitals, and waiting for people to become ill and die, but we ought to work seriously on the prevention of these troubles. It is coming. I do not know whether it will come by health insurance, or by expansion of public clinics, or by teaching in schools, but it will come. Medical and dental service and nursing service—all these things must be socialized and used by the community in such an effective way that every baby and every child and every grown person shall have as a matter of course the hygienic instruction and the bodily care he needs. There are certain principles in hygiene we teach to everybody, things about food and air and exercise and rest that apply to everybody, but there are other things that apply to certain individuals. If a man has heart trouble, or a cancer, he needs special treatment based on physical examination. We should all be examined at regular intervals, yearly perhaps ultimately, and the definite specific advice needed should be given, and the treatment furnished, so the bodies of all the people may be kept in the right condition.

The work in Bridgeport is an inspiration to us all. All of us in public health work are grateful to Dr. Fones and to you, because you have shown the whole world what to do for the care of the teeth of school children. Do not forget, however, that your movement in oral hygiene is part of this general campaign for developing a system for the care of the bodies of all, so we shall reach a maximum of health, so we may all feel that "just to live, and move, and breathe, should be a delight." England has a National Board of Health and it will come here. There will be a wider campaign in public health than we have dreamed of in the past. With your influence there will come about ultimately the right scheme that will put the State care of health on a basis as wide and sound as that on which our system of State education rests today.

The meeting then adjourned.



# THE DENTAL COSMOS

A MONTHLY RECORD OF DENTAL SCIENCE.

*Devoted to the Interests of the Profession.*

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EDWARD C. KIRK, D.D.S., Sc.D., LL.D., *Editor.*

L. PIERCE ANTHONY, D.D.S., *Associate Editor.*

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PHILADELPHIA, MAY 1920.

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## EDITORIAL DEPARTMENT

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### Perpetuation of the Orthodontic Specialty.

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THE ever-broadening scope of dentistry received its signal recognition a decade or more ago in the establishment of orthodontia as a distinct and separate specialty of dental practice largely through the individual efforts of Dr. Edward H. Angle.

Ever since the establishment of orthodontia as a distinct specialty of dentistry, the question of perpetuating it upon a sound educational basis has been a perplexing one to those interested in that field. The establishment of a postgraduate school for the education of the orthodontist was a new departure in dental education and the fact that the first distinctly designated specialists received their training through a special course of instruction embracing within its curriculum an intensive study of those phases of the subject that were not as thoroughly taught in the dental schools as was thought needful to the orthodontist, has been more or

less the criterion of all subsequent educational efforts leading to specialization in orthodontia. So that it has come to be demanded that a person to be properly fitted for the practice of orthodontia must have upon him the stamp of some recognized school devoted to the postgraduate education of orthodontists.

The dental schools in the turmoil and stress of raising the preliminary educational qualifications as well as lengthening the time in which to teach the increasing number of subjects called for in the dental course have been more than willing, even eager in some instances, to relegate the teaching of orthodontia as such to the special schools and to the mutual detriment, we believe, of both general dentistry and the specialty of orthodontia. The teaching of orthodontia in the general curriculum is essential for the student of any phase of dentistry, for no student can have a proper conception and appreciation of the function of the masticatory organ in its various relations with the other organs of the body without a proper understanding of occlusion as the orthodontist understands it today.

On the other hand, we believe it would be foolhardy, to say the least, for a newly graduated dentist under the present educational system to immediately attempt to specialize in orthodontia. It is necessary for the novitiate to have clinical experience for a period of years before he can properly appreciate the importance of a so-called normally balanced occlusion. And the far-reaching importance of occlusion can only be appreciated and understood when this function is studied as an integral part of the human organism. So also the significance of malocclusion can only be understood and appreciated through a knowledge of the manner in which it affects and is affected by the organism as a whole.

We use the term so-called normal occlusion advisedly, as there are as many normal variations of occlusion as there are individuals and the effort of the orthodontist must necessarily be toward the attainment of the individual normal. And thereby hangs the tale of many failures, the results of attempts at standardization in orthodontia, for the effort to standardize arches for variant normal types must in the nature of the case result in failure. The tendency in orthodontia we regret to say has been too much in the direction of establishing in the mouth of an abnormal individual an occlusion that would be normal for that individual

if he were normal according to type, without due regard to the many causes contributory to the resultant abnormal arch. It is inconsistent with Nature's plan, to say the least, to establish a typical arch in the mouth of a person in whom all other functions and features are more or less abnormal, as many orthodontists have learned to their chagrin. Many orthodontists have established by mechanical means a beautiful standardized symmetry in such a mouth only to see Nature upset the whole plan as soon as she is given an opportunity to exert herself.

We do not wish to be understood as saying that orthodontists generally fail to recognize the importance and influence of the contributing factors to malocclusion. What we do wish to point out is the tendency of the specialist to a limited restricted vision. The specialist in orthodontia sees little but abnormality and herein lies the paramount importance of clinical experience in general practice or in special schools in establishing a proper conception of the normal. The student of human physiology must consider all phases and variations of the body, functional as well as structural, both in their normal and pathological aspects, and not fix his attention exclusively upon isolated organs and functions. Every organ and every function is but an individual part of a complex of organs and functions, and can be understood, correlated or trained only in connection with all the rest.

Under our present dental educational scheme, the undergraduate preparation for the specialty of orthodontia should be pursued in the dental schools and later in the postgraduate orthodontia school as a clinical school where by practice and study under proper direction the young graduate may acquire the experience necessary to equip him for his specialty.

The question of educating the orthodontist is doubtless but a forerunner of other similar educational problems that will necessarily arise in the near future in dentistry because of the growing tendency to specialization, and this is as it should be, indicating as it does a healthy growth of our profession. The manner in which the orthodontist of the future is to be educated is a momentous question, not only because of the importance of the specialty itself, but also because of the directive influence it will exert upon the educational methods to be adopted for other specialties of dentistry. It is a question demanding thoughtful consideration



on the part of dental educators in conjunction with those now engaged in the practice of orthodontia.

We are more and more inclined to the view that the problem of specialization in dentistry as well as the educational problem of dentistry as a specialty of medicine will be solved on a plan whereby the course of study will be based on the fundamentals of medicine and consummated in dentistry. A similar plan should govern qualifications for all the medical specialties with proper and equivalent preliminary qualifications, the first years being devoted to the study of the fundamentals of medicine and the last two to specialization, all graduating with a common degree but equipped and licensed as specialists. Under such a plan the orthodontist could specialize in the last two years and be well equipped for a clinical postgraduate school, which would be practically equivalent to the internship of the medical graduate.

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## Dentistry and the Gold Excise.

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UNDER the title "Our Vanishing Gold Reserve" the American Mining Congress, Washington, D. C., has issued a pamphlet embodying data covering the production and consumption of gold in the United States which clearly justify the disturbing conclusion stated in its title. It is evident that our gold reserve under present conditions is vanishing and that it will vanish completely unless controlling measures are adopted and enforced.

The figures indicate that the gold production of the United States has declined from one hundred and one millions in 1915 to fifty-eight millions in 1919, a loss of forty-two per cent. in four years. Decrease in gold production has reached a point where the total value of gold mined in the United States is less than the annual consumption of the metal in the arts, a condition that seriously threatens the status of our monetary reserve in gold—the basis of our currency system.

As an attempt to practically remedy this threatening state of affairs, a bill (H. R. 13201) was introduced by Hon. Louis T. McFadden on March 22d "To protect the gold reserves of the United States from industrial depletion" by imposing an excise

tax of \$0.50 a pennyweight (\$10.00 per ounce) to be collected on the sale of all articles containing gold or gold used for other than monetary purposes, thereby creating a fund from which the gold producer is to receive \$10.00 for every newly produced ounce. Since this transaction is confined to the production and sale of gold as a commodity only, and without reference to its monetary use it cannot in any way influence the monetary status of the metal. The propriety of the principle involved in this proposed legislation cannot, we think, be seriously questioned so far as its equity is concerned, when we clearly realize the distinction between the monetary function of gold and its status as a commodity or basic material for certain arts and manufactures. As the world's standard of monetary value the unit value of gold must be stabilized at a fixed unit standard by common consent, as a basis for all commercial value and transactions. On the other hand as the basic material for arts and manufactures into which the metal enters, it becomes a commodity directly influenced in value by the law of supply and demand.

The circumstances arising out of the world war which have profoundly influenced the factors of supply and demand and created a new scale of values for all commodities and the necessities of life in general have had their direct effect in sending the value of gold as a commodity skyward in company with all other things.

Taking the wholesale index price number of all commodities in 1914 as 100, the index price number of these same commodities in 1919 is 212. So that had the gold producer shared in this increase of value he would have received 112 per cent. advance for his output of gold beyond what he actually did receive at the bullion value. Or specifically in addition to the \$58,500,000 the production for 1919 he would have received \$65,500,000.

As a matter of fact the proposed excise of \$10.00 per ounce on manufactured gold is offered as a means whereby the consumer of commodity gold shall pay a fair share of its actual market value and thus relieve the Government of the burden which it has carried in maintaining gold as a commodity at its monetary value and providing means by which the producer of gold should be assured of a fair margin of profit as the stimulus to increased production. Mr. McFadden's bill since its introduction has been amended as follows:

“That on account of the impracticability of suitably stamping finished dental restorative appliances, the Internal Revenue Department shall further prescribe such rules and regulations for the collection of the tax provided herein upon all gold used for dental purposes as will equitably protect the interest of the public; that all gold used by the Government for dental, medical and surgical purposes, and all gold employed in dental services rendered to war-risk insurance patients by the United States Public Health Service, shall be exempt from the excise provided herein; and that all gold used in corrective and restorative dental work for children of both sexes not over the age of fifteen, and all gold used in dental infirmaries conducted for the benefit of the poor and not for private profit, shall be exempt from the excise provided herein.”

The foregoing provision for the exemption of the several cases specified is clearly in recognition of the policy of exempting from excise tax all humanitarian activities involving life and health, education, religion, etc., a principle practically recognized in all phases of our national, State, and civic legislation. It is therefore eminently proper that the exemptions provided in the above quoted amendment should become part of the proposed law. But why recognize the principle involved and then arbitrarily limit its practical application? It has been the misfortune of dentistry simply because it makes use of gold and other precious metals in its service to be listed among the arts and crafts in various governmental classifications related to taxation; overlooking the fundamental fact that dentistry is a recognized and fully established department of the science and art of healing. This fact in its broad lines is already recognized by the Government of the United States in the official status which is accorded to dentistry in connection with the Army and Navy, and more recently in connection with the Public Health Service.

The use to which gold is put by the dental profession is essentially a therapeutic use for the prevention and cure of disease, the relief of distress, the restoration of function and all material used for such purposes which mean ultimately the conservation of the public health should be, indeed are in principle, exempt from taxation. Not over one-fourth of the gold classified as gold used in the arts is used in dentistry, medicine and surgery and by opticians. The balance is used for adornment or for luxurious



articles that go to a clientèle amply able to pay for them at their market value. These should bear the tax and the fraction that goes to the relief of human suffering should be exempt.

We submit that the dental profession of America should unite in emphasizing that point of view in connection with the pending action of the Congress on the McFadden bill by asking Congress to specifically exempt from the excise all gold used in dentistry, medicine, and surgery.

If the criticism be made that such an attitude is selfish or unpatriotic, as has been already intimated, the answer is recorded in the reaction of the dental profession as a whole to the demands made upon it by the world war. On that we can rest our case.

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## BIBLIOGRAPHICAL

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WAR SURGERY OF THE FACE. A Treatise on Plastic Restoration After Facial Injury. By JOHN B. ROBERTS, A.M., M.D., F.A.C.S., Professor of Surgery in the University of Pennsylvania Graduate School of Medicine, Lecturer in the Civilian School of Plastic and Oral Surgery established in Philadelphia by the Surgeon-General, U. S. A. Prepared at the suggestion of the Subsection on Plastic and Oral Surgery connected with the office of the Surgeon-General. Illustrated with 256 figures. Price \$4.50. New York: Wm. Wood & Co., 1919.

Among the late publications relative to war surgery, and especially that phase of it relating to the face, the work of John B. Roberts is worthy of our deepest consideration.

He evidently has made a special effort to meet the desires of both student and general practitioner, by avoiding tire-

some detailed descriptions which might bore the patience of the latter, while at the same time the fundamental principle of surgery has been sufficiently depicted to insure easy and comprehensive reading for the former.

The illustrations are clear cut and well selected, while the various chapters are thoughtfully arranged. The anatomical descriptions of the face, neck and skull have been condensed into what might be termed a "suggestive outline," recalling to the reader the more salient facts necessary to the subsequent treatise of the various conditions enumerated.

It is much to the credit of the book that the author has not made the mistake of confining his subject entirely to the consideration of war injuries. The essentials of surgery have been sufficiently reviewed to form the sub-structure necessary to the adequate support of the balance of the volume.

The author has used the war injuries more particularly from which to deduct important facts, than with any desire to record voluminous evidences of the physical destruction occasioned by war.

He has carefully reviewed, in a general manner, the numerous varieties of facial injuries which were occasioned by the late world's conflict, and he has wisely selected cases which adequately convey a comprehensive idea of the extent of these wounds. Almost all the illustrations of face injuries were taken from the French soldiers in the years 1915-16 who were receiving treatment at the American Ambulance Hospital at Neuilly, near Paris.

The subsequent years of the war developed many changes and improvements relative to the treatment, both surgical and mechanical. Cases of facial destruction were so varied and each one so vastly different from its predecessors that the ingenuity of the operator was constantly challenged; while the fundamental surgical laws remained the same.

The efficiency of the treatise therefore has not suffered in not having recorded some of the later surgical procedures and mechanical devices resorted to and constructed for the restoration of lost parts. During the last few weeks of the war, it was my privilege to visit many hospitals where much work along these lines was accomplished. It was quite natural to expect many divergent opinions relative to the art of facial restorations, and in this respect my expectations were brilliantly fulfilled.

The most intelligent work and pleasing results were witnessed at the American Ambulance Hospital under the direction of Dr. George Hayes and also the work done by Dr. Valledier of Paris, who was serving with the British while

operating along the Flanders front. The transplanting of large pieces of tissue from distant parts of the body, by the so-called "Caterpillar Method," particularly impressed me.

The writer's interest in Dr. Roberts' book was centered more especially on that section embracing war injuries of the face and jaws. His statement relative to the advisability of retaining all the apparently useless osseous structures, which might be hanging to the shattered wound only as splinters, is an especially wise suggestion. More damage frequently accrued from the too assiduous removal of all the badly damaged tissue of the face and jaws, than would have been caused had the original injury been left untreated.

On account of the generous blood supply to the facial area, the power of resistance to invading bacteria and the subsequent reconstruction of what at first appeared to be hopelessly destroyed tissue was often amazing. The author's statement relative to the unfortunate accidents during the transportation of troops by sea, such as suffocation due to vomitus, which was forcibly retained in the oral cavity because of the wiring of the upper and lower teeth together, is entirely correct; such accidents were later obviated by an especially constructed splint.

The chapter on "gunshot" fractures of the mandible is most complete. The various methods of treatment of injury of this area of whatever extent have been adequately considered. There have been no useful splints for the retention of disassociated parts of facial bones but what have been suggested and the technique of their construction and application clearly demonstrated.

Personally, I can candidly state that

my pre-war instruction in plastic and facial surgery under the direction of Dr. Roberts was directly responsible for my subsequent success along this class of work, during my eighteen months' foreign service. It is to be regretted that this valuable book could not have been the companion of all those who were serving in this branch of the service.

It gives me pleasure to favorably comment upon the construction of the book, the printing, the illustrations and particularly the work of its author.

(Major) C. N. RUSSELL.

PHILADELPHIA, PA.

AMERICAN ILLUSTRATED MEDICAL DICTIONARY (DORLAND). A new and complete Dictionary of terms used in Medicine, Surgery, Dentistry, Pharmacy, Chemistry, Veterinary Science, Nursing, Biology, and kindred branches; with new and elaborate tables. Tenth Edition, Revised and Enlarged. Edited by W. A. Newman Dorland, M.D. Large octavo of 1201 pages, with 331 Illustrations, 119 in Colors. Containing over 2000 New Terms. Philadelphia and London: W. B. Saunders Company, 1919. Flexible Leather, \$5.50 net; thumb index, \$6.00 net.

This standard work has been practically brought down to date in the present revised edition. We know of no better or more comprehensive dictionary of medical terms. It is especially valuable as a work of reference because of the clearness and soundness of its definitions. Though dental terminology is embraced

within its scope, there is need for amplification in that phase of the work, for while such recent additions to dental nomenclature as granuloma, exodontia, exodontist, apicoectomy, apicectomy, etc., are included, no record is made of prosthodontia, prosthodontist or periodontia and the dental uses of such older terms as cast, mold, and model are omitted. The work would have a larger usefulness in the dental profession if it included the terminology of dentistry as now accepted and standardized by the Committee on Nomenclature of the National Dental Association, or as authorized by common usage in dentistry. Apart from these omissions, we regard Dorland's Medical Dictionary as the best of its class.

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### Books Received.

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Books received are acknowledged in this column, and such acknowledgment must be regarded as a sufficient return for the courtesy of the sender. Selections will be made for review in the interests of our readers and as space permits.

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"Oral Anesthesia; Local Anesthesia in the Oral Cavity." Technique and Practical Application in the Different Branches of Dentistry. By KURT H. THOMA, D.M.D., Assistant Professor of Oral Pathology and Member of Research Department, Harvard University Dental School; Instructor in Dental Anatomy, Harvard University Medical School; Oral Surgeon, Robert Breck Brigham Hospital; Visiting Oral Surgeon, Long Island Hospital; Member National, State, and Local Dental Societies and Interstate Association of Anesthetists; Fellow in the American Academy of Dental Science; Associate Fellow of the American Medical Association. Second Edition, Revised with 79 Illustrations. Boston: M. C. Cherry, 22 Seymour Street. 1920. Price: \$4.50.

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# PRACTICAL HINTS

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This Department specially welcomes the brief presentation by our readers of any novel suggestions or methods which in their own practice have proved to be time-saving or to possess other features of advantage.

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## The Protection of the Throat During Mouth Operations.

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By D. O. HENSON, D.D.S., Philadelphia, Pa.

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THE progress of dental science in the past few years has been very gratifying, but from time to time we learn of some method which although very simple is useful and beneficial to ourselves and patients alike. Something of great importance to every operator as well as one not generally thought of, is the prevention of possible accidents especially in the setting of crowns, large inlays, bridges, the extraction of teeth and everything in general pertaining to work which is of a delicate nature. No matter how careful an operator may be or how successful he may be in his pet "stunt" or operation, the possibility of a crown, extracted tooth or what not slipping down the throat is something which may happen to any of us.

Such accidents, many of which are on record, especially those of a serious nature where the operator has had a bridge or some small article slip from his fingers and lodge in the trachea, as well as other small articles which have been lost in the same manner but fortunately passing through the organs of digestion with and without harm, are easily prevented by laying in a supply of three-inch bandage material, and where the operation is of a delicate nature, a small piece of band-

age is cut and gently laid on the back part of the tongue, with the ends protruding from each side of the mouth, protecting the throat in case any foreign body slips from the fingers.

This method is indeed a very simple one to safeguard the patient from such accidents, and in my estimation something generally neglected by most of us.

### A FEW INSTANCES OF POSSIBLE ACCIDENTS AVOIDED.

CASE I. Patient with three badly infected roots to be extracted. The roots which might have been the cause of an accident were those of a lower right first molar with a gold crown apparently solid directly in back of it.

The upper right first bicuspid was disposed of, then the lower molar roots which were easy to remove were extracted. After the last root was removed, the patient gave a sudden twist of the head. My assistant removed the gauze (inserted as described above) from the mouth and the gold crown, which must have been broken off by the slightest pressure, came out with it. Without the bandage the crown, which I naturally did not have time to look for or really did not even consider,

would have found a new home either in the stomach or in the air passages.

The gold crown proved to be inserted on an old root badly broken down below the gum margin and having a small pin as its only support.

CASE II. I was about to insert a band on the upper right first molar of a child eight years old. The bandage was inserted as usual and the band being placed in position, the child hit my arm, displacing the band with the usual pleasing results. This method is especially recommended for the insertion of regulating appliances, especially with children.

CASE III. Having prepared a lower left second molar for a crown with a pin to be inserted in the root, I again placed

the bandage in position and was about to insert the pin when the patient, subject to fits of spasmodic coughing, had his usual attack, and in such instances it is very gratifying to realize the usual precaution will prevent such small articles, if dislodged from the pliers or fingers, from doing possible harm.

In conclusion, I may add if Kerr broaches, or any instrument of such a dangerous construction, are used without the rubber dam, another method of protection is to tie such articles with good strong floss silk, but how much easier it is to have small pieces of sterile gauze bandage already cut to be used when the occasion so demands.

4837 GERMANTOWN AVE.

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## To Make Band that Will Not Become Unsoldered.

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By JOSEPH HOMER, D.D.S., Boston, Mass.

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Cut the band three times the length of the dentimeter measure. Bevel the ends to be soldered, one from the inside, the other from the outside, beveled ends to lap one and one-half times gage

of band. Solder with one-half or one-quarter millimeter square of solder. Use muriatic acid or borax for flux and plenty of heat.

87 MILK ST.

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## Protecting a Prepared Root.

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By A. V. HUGHES, D.D.S., New York, N. Y.

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IN order to keep the gum from overlapping the root of a tooth after its preparation for a crown with a post, an ordinary worn screw of a mandrel cov-

ered with gutta-percha, heated and pushed into place will remain tight and have the desired effect.

133 E. 43d ST.

# REVIEW OF CURRENT DENTAL LITERATURE

[*Archiv für Anatomie und Physiologie. Anat. Abteil.* Suppl. 1915.]

## The Growth of the Nose and the Deviation of the Septum. BY RICHARD LANDSBERGER.

The 1915 paper is based upon some experiments in which the tooth germs were removed from one side of the upper jaw in new-born dogs and upon some fortunate human material. In the dogs, preparations made after about one year, showed that the side affected had been retarded in its growth. Not only the maxilla but that entire side of the skull appeared degenerated, weak, and thin-walled.

These observations are interpreted to support the contentions:

1. That the horizontal enlargement (widening) of the nasal fossa is determined in part by

- (a) Tooth development (centrifugal tendency);
- (b) Septal growth (affording a trophic (?) stimulus to osteogenesis along both maxillary margins of the palatine suture); and

2. That the vertical enlargement (heightening) of nasal fossa is determined in part by

- (a) Tooth development (centrifugal-downward tendency);
- (b) Septal growth (by depression of nasal floor mesially along line of palatine suture).

By the centrifugal tendency of tooth development is demonstrated the well-known fact of the outward and downward path which the tooth germ follows from its first appearance until after its eruption.

Landsberger gives considerable attention to the mechanism of septal deviation. The following fairly represents the steps in his argument:

1. First, the septum consists only of the lamina perpendicularis.

2. The developing vomer is interposed be-

tween lamina perpendicularis and the maxillary margins of the palatine suture.

3. The vomer is formed within the submucous tissue of the lining of the nasal cavity.

4. The form and the direction of growth of the vomer is determined by the matrix afforded by this lining.

5. Asymmetrical deposition of bone along the maxillary margins of the palatine suture will displace this matrix from the true vertical plane.

6. Sequent to this obliquity, the plane of the developing vomer will be oblique; which condition will manifest itself as a septal deviation.

7. The initial moment in the more rapid growth of one of the maxillæ (*vd. supra* 5) and of the consequent septal deviation is to be found in variation in the rate of tooth development on the two sides.

8. Although in later life by functional adaptation the teeth may occlude approximately normally, still an inequality of the facial halves in an adult or a demonstrable septal deviation points back to an early asymmetry in tooth development.

Summarizing Landsberger's views on the mechanism of septal deviation in ontogenetic order, it may be said that asymmetry in odontogenesis results in asymmetrical maxillary development, which in its turn entails the deflection of the septal mucosa from the true vertical plane. Since this mucosa is the matrix within which the vomer is being formed, the vomer is deflected and the septal deviation is *un fait accompli*.

[*Archiv. für Anat. u. Physiol. Anat. Abteil.* 1917.]

## The Growth in Breadth of the Maxilla, the Vomer, and the Crista Septi. BY RICHARD LANDSBERGER.

In the second paper (1917), Landsberger continues to emphasize the two factors which



he considers so important in determining the conformation of the maxillæ and the nasal fossa.

1. The outward and downward path traveled by the maxillary tooth germs in their development (the "centrifugal" growth of the teeth), and

2. The development of the nasal septum.

The high-vaulted or V-shaped palate arises from an abnormal positioning of the dental germs. Normally the premolars and molars are laid down *above* the level of the nasal floor. Where they are laid down *below* this level they fail to exert their usual influence upon the growth of the nasal fossa, which consequently remains small and narrow, so that individuals who exhibit a high-vaulted palate are forced to mouth-breathing.

The teeth move down, determining the formation of the alveolar process but leaving the nasal floor behind. A V-shaped palate is not so much a "high palate" as an elongated alveolar process. Often in such cases the "centrifugal" (outward) growth of the teeth is lessened, so the dental arches are narrow as well as the nasal fossa.

The formation of septal spurs is associated with a retarded horizontal growth (in breadth) of the nasal fossa. This retardation is referable to peculiarities in septal development and to absence or inadequacy of the stimuli arising from dental development. Landsberger's viewpoint may be gained from the following steps:

1. The primitive septum consists only of the lamina perpendicularis.

2. At this time the lamina reaches the nasal floor only in the anterior third of the nose and is bound thereto by the nasal mucosa.

3. The posterior two-thirds of the lamina do not reach the nasal floor, but present an inferior free edge, which condition persists for some time.

4. Since this part of the lamina is not in contact with the line of the palatine suture, the bone which is laid down along the lower edge of this portion of the lamina in the formation of the vomer does not afford the stimulus requisite for adequate widening of the nasal fossa.

5. Also at this same time, the dental germs are either not laid down or in a very early stage and therefore cannot contribute their share toward the widening of the nasal fossa.

6. The lateral nasal wall with its three turbinates cannot under such conditions be far removed from the septum in the posterior part of the nasal fossa.

7. The turbinates and the septum may at one or a number of points come into actual contact and fuse, producing a bridge, which may be supplied with an osseous core.

8. Later in development, the lamina perpendicularis extends its contact with the nasal floor more posteriorly and the influences emanating from the progress in tooth development come into play. These two factors accomplish the widening of the posterior part of the nasal fossa.

9. Sequent to this widening, the bridges become broken, but their mesial portions, attached to the septum, may persist in adult life as septal spurs (*cristæ septi*).

10. If a septal spur occurs together with a septal deviation, it may be assumed that this deviation arose from the fact that the growth in breadth of one side of the nasal fossa was retarded by the presence of a bony bridge, while the growth in breadth of the other side took its normal course, so that the vomer (which would be drawn to this side) had to develop in an oblique direction.

[*Deutsche Monatschrift für Zahnheilkunde*,  
1918. Heft 5.]

### Orthodontia and Orthopedics of the Jaws.

BY RICHARD LANDSBERGER.

In the 1918 paper, some of the more indirect sequelæ of the dystrophies described in the previous studies are considered.

The eventual result of the aberrant developmental processes is a narrowing of the facial part of the skull. This interferes with the facial and cranial circulation of the blood and lymph. The congestion manifests itself as a hypertrophy of the lymphatic nodes, as an inadequate nutrition of the brain, as an increased secretion (salivation, lacrimation, and chronic colds), or at times as an epistaxis. These phenomena for the most part disappear when the child reaches the age of twelve or thirteen years. With the approach of the mature functioning of the permanent dentition, there is a widening of the skull and resultant freer circulation.

A condition, which is at the other extreme from the high palate, is an abnormally flat or smooth palate. Its sequelæ may be the

same as those of the former condition. The mechanism of the formation of flat palate is pictured by Landsberger as follows:

The post-canine teeth have not progressed sufficiently downward to permit their roots to pass below the nasal floor. Consequently there is only a weakly developed alveolar process. In contrast to the premolars and molars in cases of flat palate, the anterior teeth are implanted in a high alveolar process and tend to protrude. In this condition, due to the defective "centrifugal" growth of the teeth, the nasal cavity fails to acquire adequate dimensions. Where the palate is high or V-shaped the narrowing of the face is in the horizontal direction (in breadth); where the palate is flat, the facial narrowing is in the vertical direction (in height).

[*Seale Hayne Neurological Studies*, London, September 1918.]

**Hysterical Left Facial Paralysis, Right Facial Spasm, Left Ptosis, Strabismus, Aphonia, Dysarthria, Paralysis of Tongue, Paralysis of Right Arm and Both Legs, and Amblyopia Following Gassing, Rapidly Cured by Persuasion and Re-education.** BY A. F. HURST.

This is a case of a man, age twenty-eight, severely affected with "mustard gas." Paralysis of left side of face, right arm and leg came on about two weeks after "gassing." He gradually lost power of speech; he could not phonate at all and could only make unintelligible whispering sounds; unable to open mouth. About six weeks later, on examination, Hurst found eyes closed, constant spasm of whole of right side of face, especially involving the orbicularis palpebrarum and levator anguli oris. Left side of face, including the platysma, was completely paralyzed, except for extreme over-action of the frontalis in the patient's effort to overcome the ptosis, which was present on both sides in addition to the spasm on the right side. The masseters were tightly contracted, so that the patient was unable to open his mouth. Spasm was also present in left side of tongue.

The spasm of the muscles of the right side of the face slowly improved with massage and stretching the muscles by pulling the eyelids apart and pulling down the upper lip. Practically complete cure was accomplished within one day.

It is difficult to account for the extraordinary variety of hysterical symptoms which developed, but from the history of the patient it is apparent that while some were produced by autosuggestion, others probably developed as a result of unconscious suggestion on the part of those who examined him. He must have been constitutionally suggestible, and the stress of active service and particularly the heavy bombardment with gas shells every night before he was finally gassed must have rendered him still more suggestible.

[*Seale Hayne Neurological Studies*, London, April 1919.]

**Hysterical Trismus and Other Neuroses of Jaw.** BY S. H. WILKINSON.

One of the commonest causes of hysterical trismus is the pain produced by disease or injury in the neighborhood, which is aggravated by movement of the jaw. The jaws are kept voluntarily closed at first, but if the individual has been rendered abnormally suggestible owing to prolonged emotional strain, the voluntary closure of the mouth, when the pain has gone, may be perpetuated as an hysterical symptom by autosuggestion. Heterosuggestion also plays a prominent part in the production of many hysterical symptoms.

CASE I. Hysterical trismus of six months' duration following mumps; male, of eighteen years; after three weeks' treatment with hot fomentations, it was found that his jaws were tightly clenched. Three teeth extracted to permit feeding. Three times under an anesthetic, his jaws were opened, but immediately he regained consciousness his teeth again became tightly clenched. For six months he received treatment by electricity and massage. Could only separate his jaws about 1/8 inch; on voluntary attempting to open his mouth the masseters were immediately thrown into extreme tonic spasm. He was treated by persuasion and re-education, and at the end of half an hour he could open his mouth to its fullest extent and could close it strongly.

CASE II. Hysterical trismus of seven months' duration produced by heterosuggestion in the course of an examination for facial paralysis; male, age thirty-four years. In this case there was originally an organic facial paralysis, and after recovery from this there was some over-action of the muscles of



the right side of the face including the platysma. The trismus was undoubtedly produced by unconscious hetero-suggestion (*cf.* case of A. F. Hurst, page 676 of this issue).

CASE III. Given on authority of A. F. Hurst. An adult man, with severe trismus, setting in about twelve hours after having trodden on a rusty nail. The patient had all the appearance of a typical case of true (infectious) tetanus, but the rapidity with which the symptoms developed after the wound was suspicious. On questioning, it was learned that just a week before he had read in the paper of a man who had had an accident precisely similar to his own and who had developed lock-jaw and died. Hurst was convinced that this was a case of auto-suggestion and explained to the patient that, as his symptoms had developed so quickly after the injury, they were quite certain to disappear with equal rapidity. He received no other treatment. All the symptoms had completely disappeared the following morning.

CASE IV. Given on authority of J. L. M. Symms. Hysterical clonic spasm of jaw following a kick from a horse; man, age thirty-two years. The condition lasted about a year. By persuasion and re-education, he was gradually taught to open and close his mouth and to speak intelligibly.

Hysterical tremor of the jaw, like hysterical tremors in other parts of the body, is always associated with more or less rigidity of the muscles involved. The origin is usually emotional (*e. g.*, "teeth chattering with fear"). The symptom is then perpetuated by auto-suggestion and is thus eventually hysterical. It is generally associated with the other hysterical symptoms, such as stammering and tremor of the limbs (as in shell shock), but it may be present by itself. The frequently recurring chattering of the teeth as in malaria may be perpetuated as an hysterical tremor of the jaw. The most effective treatment is to explain to the patient the origin of his condition, and then obtain by persuasion and re-education complete relaxation of the muscles involved.

CASE V. Male, age twenty-seven years. Rendered unconscious by shell explosion; following this tremor of legs and mandible. After fourteen months, he was treated by psycho-therapy, complete relaxation of all the affected muscles was obtained on the same

day as the treatment. On the following day he was normal in every way.

CASE VI. On authority of R. G. Gordon. Male, age forty years. Hospital, in which he was a patient (nephritis), heavily bombed. He fell out of bed and had all maxillary anterior teeth knocked out; following this he developed a stammer and a jaw tremor. This lasted eighteen months. The movements of the jaw were stopped in ten minutes by simply persuading him to relax his masseter muscles. Two days later, however, he relapsed as a result of a terrifying war dream. He was then treated by hypnosis, and his insomnia and dreams were cured; no recurrence of tremor.

CASE VII. On authority of J. F. Venables. Male, age twenty-one years, buried by a shell explosion, following which he developed a severe jaw tremor and generalized tremors of legs. Legs cured in six months. The jaw tremor, however, persisted for eighteen more months, when by one-half hour's treatment by psycho-therapy he was completely cured.

CASE VIII. On authority of J. L. M. Symms. Male, age thirty-six years; attack of fever associated with a rigor, since when he had been unable to keep his jaw still. This persisted three months. He was then treated by psycho-therapy, passive movements of the jaws being carried out until the muscles were completely relaxed. At the end of six hours all tremor had ceased.

In flaccid paralysis of the muscles of the jaw, the jaw hangs loosely, no attempt being made either to close or open the mouth. The cause is usually a wound, which temporarily inhibits the muscles on account of the pain caused by mastication. When the pain disappears, the voluntary inhibition of movement may pass into complete inability to open and close the mouth, the condition being now hysterical.

CASE IX. Hysterical flaccid paralysis of jaw muscles of three months' duration following a gunshot wound of face. Male, age twenty-four years; machine-gun bullet entered below the zygomatic arch on left side and emerged just below the right ear. Massage and electricity brought no improvement in three months. It was then pointed out to him that the wound he had received had not injured the muscle which "worked his jaw" on the right side, although it had temporarily



paralyzed the one on the left. He was then told to make the right masseter contract and to feel it with his fingers. He immediately did so, and his attention was drawn to the

fact that the left masseter was also contracting. In a few minutes he was able to open and close his jaw in a perfectly normal manner.

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## PERISCOPE

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**Nitrous-Oxid Analgesia in Obstetrics.**—Danforth's conclusion is that his experience has been for the great part satisfactory in the use of nitrous-oxid analgesia in obstetrics. It may, however, not be used for a period exceeding three hours. It should be given at the beginning of each pain, not uninterruptedly, but the gas should be started immediately at the onset of a pain. Good results cannot be obtained if the pain is allowed to get well under way before inhalation is started. Cyanosis must and can be avoided. If the baby is born cyanotic allow the mother to inhale pure oxygen for a few breaths before tying the cord. The technique of administration of the gas must be mastered for ideal results to be obtained.—*American Journal of Obstetrics*, per *Philadelphia Weekly Roster*.

**Ionic Medication.**—In regard to ionic medication, although I have always stated that if in any place ionic medication has a value it should be in treating root canals, yet, up to the present, although I have persevered with the treatment, I have failed to see that the method used is any better, or even as good, as most of those used today. The practice of ionic medication up to the present time is a matter of "mere opinion," and we should not in a scientific society be satisfied with just a "mere opinion." If it could be proved that the ions had a selective action on bacteria, and did not destroy the reparative cells so needed at the apex of the tooth, well and good, but, unfortunately, no user of electric ions has yet been able to prove this, and it is this very point which makes it a doubtful remedy to use.

From all the clinical tests we are able to carry on with electric ions, we know we cannot produce much sterility without either forcing a strong current through for a short time, or using a weak current for a long time; and if the current, no matter how weak or strong, is sufficient to kill bacteria in the

root canal and around the apex, how is it going to be prevented from destroying the surrounding living cells in which the bacteria are absorbed, and are being constantly ingested?—H. C. MOXHAM, *Commonwealth Dental Review*.

**Nitrous Oxid-Oxygen Anesthesia.**—One of the chief arguments for the safety of nitrous oxid-oxygen and its value lies in the fact that, in the presence of what may be classed as grave surgical risks, severe infections, pathologic and symptomatic anemias, traumatic shock, acute pulmonary affections, and moribund conditions, the surgeon chooses this anesthetic because it will do his patient less harm, immediately and remotely, than any other general anesthetic. He may elect to operate under local anesthesia if possible or under intraspinal injection in a few cases: but when all other general anesthetics are contraindicated he will call for gas. All authorities agree that nitrous oxid-oxygen is the choice for minor operations and cases of short duration, the only objection offered being its high cost.—J. R. MCCURDY, M.D., *American Journal of Surgery*, per *Philadelphia Weekly Roster*.

**Cavity Preparation for Cast Inlays.**—In the preparation of cavities we are using burs less and chisels more, growing more and more enthusiastic over the effectiveness of these instruments to cut correctly formed cavities with a minimum of discomfort to the patient.

Angularity of the cavity adds greatly to the retention, and smooth plane walls facilitate the drawing of the wax pattern, both of which characteristics can be best secured with chisels.

In general, we endeavor to get as flat a seating as possible, and give all the other walls a flare of between 10 and 20 per cent. The axial walls are no exception to this rule.

Line angles at the junction of any two walls and point angles at the junction of any three line angles should be sharp and distinct, but corners projecting into the cavity should be well rounded. If this is not done, they are liable to break off the mold during the process of burning out or casting, and thus produce an imperfect cast.

The gingival margin should be carried just beneath the free margin of the gum, but not to the gum attachment unless the destruction by caries has made it imperative. In that case no gingival bevel should be attempted, but in all other cases this bevel must not be omitted.

It is one of the most difficult but essential steps in cavity preparation, and the one most frequently neglected. Nos. 17, 18, 19, and 20 of the set of U. of M. chisels were specially designed for this work, but whenever the embrasure can be sufficiently opened to allow the direct thrust of a narrow, straight chisel, a more perfect result can be secured. The other proximal margins must be carried well out of the embrasure into relatively immune areas.

It is our practice to bevel no other margins except horizontal margins in non-vital teeth, because we aim to cut other walls at right angles to the segment of the circle formed by that portion of the surface where our margin falls. This will cut the walls parallel to the enamel rods, and leave no short rods at the margin. If there is any doubt in certain areas about short rods remaining, the flare of the walls should be slightly increased.

We are practicing an inward incline at the cervical, making an acute angle between the gingival and axial walls, which I believe is not a universal procedure, but in our hands it gives better results.—JOHN J. TRAVIS, *Journ. N. D. A.*

**Amalgam Fillings.**—Exact laboratory tests have definitely shown that alloys do not deteriorate with age either before amalgamation or after completion of the filling.

Plentiful use of mercury during the mix is necessary to maximum strength and stability, and does not affect the amount remaining in the finished filling. The more thorough the mix in the mortar up to the time of six min-

utes, the stronger and the more stable the filling; but the increase in strength after three minutes is so small that it does not justify the extra time.

The more mercury actually rubbed into the alloy the stronger the filling. The great wrong is due to our failure to remove the mercury not amalgamated.

Bulk changes, developed by time and apparent to the naked eye, made from representative high-grade alloys, are entirely due to excess mercury in the finished filling. Practically every well-known high-grade alloy contains zinc, irrespective of which thousands of permanently good amalgam fillings have been made. This fact clearly proves that zinc alone is not responsible for the movement.

That important attribute, adaptability to cavity walls, is lost when crepitus develops in amalgam, because amalgam in that condition breaks as it is compressed, and these minute breaks cannot be eliminated by subsequent packing. Crepitating amalgam packs like snow, bridging the defects as snow bridges the air-spaces contained, which cannot be eliminated until subjected to very heavy pressure. The more sloppy the snow, the more dense and hard the snowball can be made.

If while making the filling the amalgam mass becomes stiff, more mercury may be added and kneaded into the mass to secure the desired plasticity without impairing the strength of the filling.

The excess mercury retained after making the mix to insure a decided plasticity varies with the size and form of the cavity, or the time required to fill it. This excess, commonly removed during the final kneading, is in nowise dangerous, because it is always the first expressed during the packing. The dangerous excess is the final excess that will remain in the mass after forcible squeezing during the final kneading, which will always become apparent under thorough and forcible condensation.

Smooth plasticity is not a guide to a thorough mix; smooth plasticity develops long before we reach a condition of thorough amalgamation. Vigorous mixing in the mortar for a minimum time of three minutes is the only dependable guide to a perfect mix.

—WM. E. HARPER, *Journ. N. D. A.*

## OBITUARY

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### Dr. James A. Libbey.

[SEE FRONTISPIECE.]

DIED, at his home, Swissvale, Pa., March 15, 1920, in his seventy-fourth year, JAMES ADDISON LIBBEY, D.D.S.

Dr. Libbey was born at Beaver, Pa., August 19, 1846, the son of William Libbey, cabinet maker, and Agnes Libbey. He obtained his early education in the public schools of Beaver, Pa., and at the Beaver Academy. He early became interested in the profession of dentistry and entered the office of Dr. J. G. Templeton, Pittsburgh, Pa., where he served a dental pupilage of several years, later entering the Pennsylvania College of Dentistry, Philadelphia, from which institution he received the D.D.S. degree in 1882.

Previous to his graduation, Dr. Libbey practiced dentistry in Moundsville, W. Va., and in East Liverpool, Ohio. After his graduation he established himself in Pittsburgh, Pa., where he continued the practice of his profession until the time of his death.

Dr. Libbey for a long period of time was quite active in dental society circles and was well known among his dental *confrères* as a skilful and successful practitioner of dentistry. Kindness of heart and gentleness of spirit were the crowning attributes of a lovable character. His genial and kindly manner together with his unfailing loyalty to his profession attracted to him a large circle of friends within and without the profession, and endeared him to the hearts of all who enjoyed the privilege of his acquaintance.

His popularity in the dental profession in the east and his ability as a presiding officer resulted in his selection as president of the National Dental Association in the year 1902. He was also president of the Pennsylvania State Dental Society in 1895, a member of the Odontological Society of Western Pennsylvania, and an honorary member of the Psi Omega dental fraternity. Dr. Libbey was for ten years a member of the Pennsylvania State

Board of Dental Examiners, and was active in dental legislative matters, both national and international.

Dr. Libbey was married September 1876 to Miss Annie M. Russell, Bridgewater, Pa., who with two sons, James T. and Wilber F. Libbey, survives him.

His remains were interred in the cemetery at Pittsburgh, March 17, 1920.

### Dr. William G. Law.

DIED, at his home in New York City, of influenza, January 30, 1920, WILLIAM GEORGE LAW, D.D.S.

Dr. Law was born in Flint, Mich., the son of William and Ruth (Husted) Law, where he received his early education in the Flint public schools. In 1896 he entered the dental department of the University of Michigan and in 1899 received his D.D.S. degree from that institution.

Immediately after his graduation he located in Flint, Mich., where he practiced for two years. He became interested in orthodontia, and having decided to specialize in this branch of dentistry, entered the Angle School of Orthodontia at St. Louis, Mo. In 1904 he removed to Dresden, Germany, where he associated himself with Dr. William A. Spring, devoting his attention to the specialty of orthodontia. In 1906 he removed to Berlin, Germany, where he continued to practice until the outbreak of the war, when conditions became so disagreeable that he returned to America and located in New York City, where he practiced until the time of his death.

During his residence in Germany, Dr. Law numbered among his patients many of the nobility of Germany, Austria, and Russia. He was a man of strong, personal magnetism, which won for him many warm friends. His skill as an orthodontist, combined with his studious habits, inventive mind and enthusiasm in his work, won for him a foremost position in his profession. His attractive



personality and his unusual technical skill combined with the highest ideals of professionalism particularly fitted him for pedagogical work, and at the time of his death he was organizing a school for the teaching of the specialty of orthodontia.

Dr. Law was a member of the American Dental Society of Europe, the W. D. Miller Club of Berlin, and one of the founders of the American Orthodontia Society of Europe, which he served as president for two years. He was also a member of the Eastern Association of Graduates of the Angle School of Orthodontia, the National Dental Association, the Dental Society of the State of New York, and the First District Dental Society of the State of New York.

Dr. Law was married in 1901 to Miss Margaret Layton of Bay City, Mich., who, with one daughter, survives him.

His remains were interred in the family burial-ground at Flint, Mich., February 4, 1920.

### Dr. Joel M. Wood.

DIED, November 24, 1919, of bronchial pneumonia, at his home in New Sharon, Iowa, Dr. JOEL MAURICE WOOD.

Dr. Wood was born at Smithfield, Jefferson County, Ohio, on February 1, 1848, the son of Joel and Zeruah (French) Wood. He obtained his early education in the public schools of Smithfield, Ohio. In his early manhood Dr. Wood became interested in dentistry and for a short while attended the Miami Medical College at Cincinnati, Ohio, and later studied dentistry in the office of his brother, Dr. John H. Wood. He successfully passed the examination of the Board of Examiners of Iowa and associated himself in practice with his brother at Smithfield, later removing to New Sharon, Iowa, where he practiced his profession for upwards of thirty years.

Although not a graduate of a dental college, Dr. Wood was a splendid dentist and highly esteemed in the community in which he lived and practiced. He was a constant student of his profession and was thoroughly familiar with all of the advances in dentistry through his careful and constant reading of the periodical literature and study of textbooks. Dr. Wood was a member of the

Masonic Lodge A. F. and A. M. for fifty years.

He was married December 1, 1879, to Miss Martha Ellen Locke, who, with two daughters, survives him.

### "In Memoriam" Resolutions.

#### Dr. Henry S. Miller.

RESOLUTIONS adopted by the Rochester Dental Society on the death of Dr. Henry S. Miller:

*Whereas*, Dr. Henry S. Miller passed from this life on Sunday, February 22, 1920, at his home, 18 Sibley Place, aged eighty-two years.

*Whereas*, Dr. Miller was born at Hartwick Seminary, Otsego County, in 1837, the son of Rev. A. B. Miller, president of Hartwick Seminary. On completion of his early education Dr. Miller spent some time in the prairie country of the West acting for several years as ticket agent of the Union Pacific Railway. Coming East Dr. Miller graduated from a course in dentistry, and began practice in Louisville, Ky. In 1865 Dr. Miller removed to Rochester and took over the practice of Dr. James Brown in State street. He later became affiliated with Dr. A. H. Fowler, having offices in the Powers Block.

*Whereas*, Dr. Miller was one of the founders and the first president of the Rochester Dental Club, which was later incorporated as the present Rochester Dental Society. His interest in philanthropic dentistry led to the formation and inception of the first free dental clinic in the world. This clinic was held in the old City Hospital and later was moved to rooms in Washington street. This institution, which was sustained with no end of personal sacrifice to Dr. Miller, proved to be the beginning of the movement that later crystallized into the present Rochester Dental Dispensary.

*Whereas*, Dr. Miller was a mechanical genius of no mean ability and invented many instruments and appliances which contributed materially to the present standard equipment.

*Whereas*, Dr. Miller won a prominent place in literary and musical circles and was an amateur musician of considerable note. He was especially fond of outdoor life and was most happy in learning the secrets which only Nature can impart. Thus his life being wholesome and well rounded out made it most desirable and profitable to be accounted his friend.

RESOLVED, That we, the members of the Rochester Dental Society, do record our deep sense of loss which the dental profession and this society have sustained; and be it further

RESOLVED, That we extend to the family our heartfelt sympathy and that these resolutions be spread on the minutes and be published in the dental journals, and that copies be sent to the family of our departed member.

HOWARD F. LEWIS, *Chairman,*

JOHN H. PARMALEE,

CHARLES J. PIERCE.

*Committee.*

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#### Dr. Henry W. Morgan.

AT a recent meeting of the Faculty of the School of Dentistry of Vanderbilt University, called in honor of the memory of their late co-worker and leader, Dr. Henry W. Morgan, the following memorial resolutions were unanimously adopted:

In the death of Dr. Henry W. Morgan the dental profession has lost one of her brightest lights. Truly, his life was spent in the service of his fellow man, and, in rendering this service, he lived true to an ideal which was ever dominant in his heart. His was a positive character. With strong convictions, in defense of which he was outspoken and fearless, there mingled such kindness of heart and absolute loyalty to friends, that those whose rare privilege it was to know him will always feel the imprint of his personality in their lives.

Dr. Morgan sought truth for its own sake; with error he was uncompromising. During his lifetime he did more to advance the cause of dental education and to uphold the highest standards of dentistry than any other man in the South. His close connection with the School of Dentistry, Vanderbilt University, both as Dean and Professor of Operative Dentistry, gave opportunity for some of the most far-reaching activities of his whole life. In the history of this institution, the name of Dr. Morgan will occupy a place second only

to that of his illustrious father. We who have been cheered and heartened by his friendship and have profited through his council and leadership, feel his absence keenly. Our palms yet tingle with the sincerity of his handclasp, and his clear sharp eye still looks encouragement and hope into ours. He did good deeds with singleness of heart, without ostentation. Many of us recall instances of Dr. Morgan's nobility of soul. The widow, the orphan, the struggling student, the young dentist blue and discouraged—all received something which made life's burdens lighter. As we gather in our minds the fruits of his life and note their quality, we feel that he indeed caught the spirit of the Master. When we come to view the good that was in the life of our departed friend, his faults sink into insignificance. Thus it is with all who live for the highest.

Words, we know, but poorly express the profound sentiments of our souls. Yet, we take this means of paying, as best we can, a tribute of respect and love to the memory of our brother, and of expressing our sincere sorrow in his death. We shall not look upon his earthly face again. His voice is hushed among us. Yet, have we really lost him? Has he passed out of our lives forever? No! While the body is reposing in Mother Earth, his work, his spirit are with us still. His work remains a monument imperishable; his spirit, the "flaming torch," is thrown to us. This we must catch and bear aloft as we follow in his footsteps.

In expressing our sense of loss, we do not forget the bereaved ones in the home. Our hearts go out to them in their hour of deep sorrow, and especially do we sympathize with her whose devotion to our brother was the joy and inspiration of his life. May her sorrow be tempered in the contemplation of a life so worthily spent. Dr. Morgan did not live in vain. He tasted the joys of noble achievement and passed the cup to others. Let all of us find solace in the assurance that he has already heard the Master say, "Well done, thou good and faithful servant. Enter thou into the joy of thy Lord."



## Preparedness League of American Dentists.

ORGANIZED UNDER THE AUSPICES OF THE N. D. A.

Office of J. W. BEACH, *President*, 131 Allen St., Buffalo, N. Y.

### Report on French-Belgian Fund.

THE accompanying letter from Dr. P. Fontanel, Treasurer of L'Aide Confraternelle, Paris, France, has suggested the thought that a great work might be accomplished by our National, State, and component societies by adopting, as it were, a few of the orphans of our unfortunate brother dentists and supplying means for their education and support. A separate fund could be devised by each society entertaining this great object, or the sum required taken from the general treasury. A sum not to exceed \$500 each year would doubtless be sufficient. Surely this plan would prove a source of constant interest and satisfaction to every member of our profession participating therein and also provide a definite purpose for our efforts.

Will not the secretaries of the various societies immediately communicate with the president of the League, who will gladly outline the plan? You will recall that many organizations and independent groups of men throughout the country adopted many Armenian orphans in this way during the Near East campaign. Should we not use the same means to aid the children of our departed brother dentists? Let us be not alone brothers in spirit, but fathers in deed. We earnestly request that you write *now* to

J. W. BEACH, *President*.

Paris, le 20 Février, 1920.

*My dear Doctor*,—Dr. W. S. Davenport has handed to us the cheque for \$2000 which you kindly forwarded to him as first instalment of the PREPAREDNESS LEAGUE. The acknowledgment of such a generous gift has been entrusted to me and I beg you to accept the thanks of all our colleagues and the chief members of the Committee of "Aide Confraternelle."

I see that you have inquired of Dr. Davenport what use we made of the money. I must state at once that our aim is twofold. First, we help those of our fellow dentists whose connections have been lost because the towns they lived in have been destroyed. After years of service during the war, they came back to homes which are heaps of ruins and find no work to do in a deserted town. They

are compelled to begin life anew; they must buy again the necessary apparatus and settle in new places where work is hard to get because they are strangers. We felt we ought to help them and do so by giving, or lending without interest, rather large sums. We have in the last six weeks paid out 10,000F. for this purpose. Now we have also another aim, still more important in our eyes, we want to help our orphans.

I think how many wives, whose husbands had gone to the front, have remained in an impoverished home, the surgery being closed, waiting for his return and waiting in vain. They have not the wherewithal to live, and yet there are children to be brought up. The Committee of "Aide Confraternelle" have thought that a proper feeling for the dignity of our profession made it imperative to them to bring up and educate those orphans as their fathers would have done.

We must be able then to give each at least 100F. monthly till they are of age. And yet we must needs have 200,000F. to do it, and if we wish to help the mothers as well another 15,000F. are necessary. We are far from being able to meet such expenses, since we have only 100,000F. left, 35,000F. having been spent in relieving some of the most distressing cases; what remains must be devoted to the help of those of our colleagues whose homes have been destroyed. We are, therefore, 35,000F. short of our wants. So long as we do not possess such a sum, we cannot promise our orphans an annuity, and tell the mothers not to fret, that we have secured the children's livelihood till they are of age.

Now my dear colleague, you know our aims and needs; you are acquainted with the use we make of the funds you sent us; for the sake of the solidarity which is so strong a tie among the members of our profession, do go on with your propaganda for our orphans; and if you can, send us thousands of dollars. We do get fresh subscriptions in France nearly every day, but they are small. For every French dentist has had to suffer from the war and is in much reduced circumstances. We duly invite to our meetings your two delegates, Drs. Davenport and Burkhardt, and let them hear whatever we do. In future we shall give them accurate memoranda



so as to allow them to give you every detail concerning our doings.

Believe in our gratitude for the help you have been able, so far, to afford us and please give a hearty message from us to all members of the PREPAREDNESS LEAGUE.

We remain, dear Doctor;

Very truly yours,

P. FONTANEL, *Treasurer*,  
la rue Vercingetorix, Paris.

Dr. L. M. WAUGH,

Treas. of the League of American Dentists,  
576 Fifth Ave., New York.

*My dear Doctor*,—I am in receipt of your favor of January 2d, with draft on Credit

Lyonnais for the amount of 21,692 francs, which will be turned over to our Committee for the Relief of French and Belgian Dentists, and you will receive a receipt from them in due time.

This kind act on the part of our League, the Dentists of America, will be far-reaching I can assure you.

We will keep you posted from time to time of the use to which the funds are being put.

The demands of our Paris Committee are very extensive, and your suggestion of further remittances gives us great encouragement.

Ever sincerely and fraternally yours,

WILLIAM SLOCUM DAVENPORT.

## SOCIETY NOTES AND ANNOUNCEMENTS

### Coming Dental Society Meetings.

#### National Meetings.

AMERICAN SOCIETY OF ORTHODONTISTS.  
Chicago, Ill. April 5th to 7th.

CANADIAN DENTAL ASSOCIATION. Ottawa,  
Ont. August 17th to 20th.

NATIONAL DENTAL ASSOCIATION. Boston,  
Mass. August 23d to 27th.

#### State Meetings.

##### MAY.

CONNECTICUT DENTAL HYGIENISTS' ASSOCIATION. Bridgeport. May 21st and 22d.

DENTAL SOCIETY OF THE STATE OF NEW YORK. Albany. May 13th to 15th.

INDIANA STATE DENTAL ASSOCIATION. Indianapolis. May 17th to 20th.

MONTANA STATE DENTAL SOCIETY. Great Falls. May 24th to 29th.

NORTH DAKOTA STATE DENTAL ASSOCIATION. Grand Forks. May 11th and 12th.

ONTARIO DENTAL SOCIETY. Toronto. May 3d to 6th.

TENNESSEE STATE DENTAL ASSOCIATION. Chattanooga. May 27th to 29th.

##### JUNE.

FLORIDA STATE DENTAL SOCIETY. Miami. June 15th to 17th.

MAINE DENTAL SOCIETY. Old Orchard. June 23d to 25th.

SOUTH CAROLINA STATE DENTAL ASSOCIATION. Columbia. June 15th to 17th.

VIRGINIA STATE DENTAL ASSOCIATION. Old Point Comfort. June 30th to July 3d.

##### JULY.

NEW JERSEY STATE DENTAL SOCIETY. Atlantic City. July 14th to 16th.

PSI OMEGA FRATERNITY (OHIO ALUMNI CHAPTER). Cedar Point. July 12th to 14th.

WISCONSIN STATE DENTAL SOCIETY. Milwaukee. July 13th to 15th.

#### Examiners' Meetings.

CALIFORNIA BOARD OF EXAMINERS. San Francisco. June 21st.

COLORADO BOARD OF EXAMINERS. Denver. June 1st.

CONNECTICUT DENTAL COMMISSION. Hartford. June 17th to 19th.

FLORIDA BOARD OF EXAMINERS. Miami. June 11th.

GEORGIA BOARD OF EXAMINERS. Atlanta. June 7th.

IDAHO BOARD OF EXAMINERS. Boise. July 13th to 16th.

ILLINOIS DEPARTMENT OF REGISTRATION. Chicago. June 21st to 26th.

IOWA BOARD OF EXAMINERS. Iowa City. June 7th.

MAINE BOARD OF EXAMINERS. Augusta. July 7th to 9th.

MARYLAND BOARD OF EXAMINERS. Baltimore. June 9th and 10th.

MASSACHUSETTS BOARD OF EXAMINERS. Boston. June 14th to 18th.

MICHIGAN BOARD OF EXAMINERS. Ann Arbor. June 14th to 19th.

MISSISSIPPI BOARD OF EXAMINERS. Jackson. June 15th.

MONTANA BOARD OF EXAMINERS. Helena. July 12th.

NEBRASKA BOARD OF EXAMINERS. Omaha, June 8th and 9th. Lincoln, June 8th to 12th.

NEW HAMPSHIRE BOARD OF EXAMINERS. Manchester. June 30th, July 1st and 2d.

NEW JERSEY BOARD OF REGISTRATION. Trenton. June 28th to July 2d.

NORTH CAROLINA BOARD OF EXAMINERS. Wrightsville Beach. June 19th.

OKLAHOMA BOARD OF EXAMINERS. Oklahoma City. June 7th to 12th.

PENNSYLVANIA BOARD OF EXAMINERS. Philadelphia and Pittsburgh. June 23d to 26th.

RHODE ISLAND BOARD OF REGISTRATION. Providence. June 29th to July 1st.

SOUTH DAKOTA BOARD OF EXAMINERS. Sioux Falls. June 23d to 26th.

VERMONT BOARD OF EXAMINERS. Montpelier. June 28th to 30th.

VIRGINIA BOARD OF EXAMINERS. Richmond. June 8th.

WISCONSIN BOARD OF EXAMINERS. Milwaukee. June 21st.

### **Connecticut Dental Hygienists' Association.**

THE annual meeting of the Connecticut Dental Hygienists' Association will be held in Bridgeport, Conn., May 21 and 22, 1920, at the Stratfield Hotel. A program of unusual interest has been planned. All ethical dentists and dental hygienists are invited.

### **Montana State Dental Society.**

THE Montana State Dental Society will hold its next annual meeting in Great Falls, beginning May 24th, and continue for six days on the postgraduate plan. Dr. Hall and Dr. Roach of Chicago and Dr. Brickers will conduct the classes. All ethical dentists are cordially invited to attend.

J. E. BAKER, *Sec'y*.

### **Ontario Dental Society.**

THE fifty-third annual meeting of the Ontario Dental Society will be held in Toronto, Ont., May 3, 4, 5, and 6, 1920.

J. A. BOTHWELL, *Sec'y*,  
2 Bloor st., E., Toronto, Ont.

### **Indiana State Dental Association.**

THE sixty-second annual meeting of the Indiana State Dental Association will be held in the Claypool Hotel, in Indianapolis, Ind., May 17, 18, 19, and 20, 1920.

A. J. KIMM, *Sec'y*,  
704-05 Citizens Bank Bldg., Evansville, Ind.

### **North Dakota State Dental Association.**

THE North Dakota State Dental Association meets in Grand Forks, May 11 and 12, 1920. A live program has been arranged, which will be followed by the North Dakota Postgraduate School, which has obtained the services of Dr. M. M. House to give instructions in dental prosthesis, and Dr. A. E. Smith on conduction anesthesia and nerve blocking.

SOLOM CRUM, *Sec'y*.

### **Tennessee State Dental Association.**

THE fifty-third annual meeting of the Tennessee State Dental Association will be held in Chattanooga, Tenn., May 27 to 29, 1920.

OLIVER J. O'NEAL,  
*Chmn. Publicity Committee*,  
Chattanooga, Tenn.

### **Dental Society of the State of New York.**

THE fifty-second annual meeting of the Dental Society of the State of New York will be held in Albany, May 13, 14, and 15, 1920, at the Hotel Ten Eyck. An interesting program of essays and clinics is being prepared and will be announced later. All ethical dentists residing in New York and adjoining States are cordially invited to attend the meeting.

Dr. L. S. Blatner, 346 State st., Albany, N. Y., is chairman of the Exhibits Committee.

A. P. BURKHART, *Sec'y*,  
52 Genesee st., Auburn, N. Y.

# HOTEL RESERVATIONS

FOR THE

## National Dental Association Convention,

### Boston, August 23-27,

### SHOULD BE MADE AT ONCE.

ON the following pages will be found a list of hotels, types and prices of rooms.

Read instructions, and to avoid unnecessary delay, mail application *at once*.

The Committee will endeavor to make reservations as requested, and will send a card, signed by the hotel, confirming completed reservation.

Do not write to hotels, as arrangements

have been made to make all reservations through the Committee.

There will be no Headquarters hotel. Headquarters will be in the Mechanics' Building, the place of meeting.

Reservations will be made in the order in which applications are received.

With the co-operation of everyone the Committee will be able to secure accommodations for all members attending the Convention.

### INSTRUCTIONS.

Select type of accommodations desired. (See Types of Hotel Reservations below.)

Send your Application for Hotel Reservation. Be sure to mention type, price, three

choices of hotels; if you will share room or suite with others, time of arrival.

Sign Application, giving name and address in full, and mail *at once* to

**Committee on Hotel Reservations,  
National Dental Association,  
Box 126, Boston, 10, Mass.**

Be sure to place the figure 10 where shown in address.

### TYPES OF HOTEL RESERVATIONS.

#### Type A.

Suite of Parlor and 2 Bedrooms, for 4 persons, private bath for the suite, 2 single beds in 1 room, double bed in other room.

#### Type C.

Suite of Parlor and Bedroom, for 2 persons, private bath, 2 single beds.

#### Type E.

Double (outside) Bedroom, for 2 persons, private bath, 1 double bed.

#### Type G.

Single (outside) Bedroom, for 1 person, private bath, single bed.

#### Type J.

Single Bedroom, for 1 person, without attached bath, single bed.

#### Type B.

Suite of 2 Bedrooms, for 4 persons, bathroom between bedrooms, 1 room with 2 single beds, other room with double bed.

#### Type D.

Double (outside) Bedroom, for 2 persons, private bath, 2 single beds.

#### Type F.

Double (inside) Bedroom, for 2 persons, private bath, 1 double bed.

#### Type H.

Single (inside) Bedroom, for 1 person, private bath, single bed.

#### Type K.

Double Bedroom, for 2 persons, without attached bath, double bed.

*Note.* The word "inside" indicates accommodations are located on courts. Variations from the usual types of suites and rooms are explained in notes at the bottom of the list of hotels. To secure the best accommodations members are advised to club together and use the many desirable suites listed. (See next page.)



IN ALL CASES THE FIGURES INDICATE THE PRICE PER DAY FOR EACH SUITE OR ROOM.

HOTELS	A	B	C	D	E	F	G	H	J	K
Adams House		\$9.50 Note 1 Note 7	\$8.00			\$3.50			\$2.00 2.50	
Arlington		6.00 6.50 Note 7	6.00 Note 7	\$4.00 5.00	\$3.50 4.00		\$3.00 3.50			
Avery		12.00		7.00	6.00					
Bellevue		11.00 13.00		7.00 8.00 10.00	5.00 6.00 7.00			\$4.00 5.00	2.50 3.00	\$4.00 5.00 6.00
Brewster		10.00 Note 7		4.50	4.00		2.50		2.00	3.00
Brunswick	\$15.00	10.00 Note 7		7.00	6.00	5.00	3.50		2.50	4.00
Buckminster	15.00 Note 2	10.00 Note 2	9.00	7.00					2.50	4.00 Note 2
Colonial		6.00 Note 7	5.00 Note 7		3.00 3.50				1.50	2.00
Commonwealth		8.00 Note 7			4.50 5.00 6.00		3.00 4.00		2.50 3.50	3.50 4.50
Essex					7.00	7.00	4.00	4.00	3.00	5.00
Fritz Carlton	9.00 10.00 Note 4		6.00 7.00 8.00 9.00 Note 3		5.00		4.00		2.50 3.00 3.50	3.50 4.00 4.50
Garrison Hall	12.00 Note 7	10.00 Note 7	5.00 Note 7		5.00	4.00	3.00			
Harvard	12.00	10.00	5.00 Note 7							
Langham	7.00	7.00 Note 7	4.50 Note 7		3.50				1.50	2.50
Lenox	15.00 Note 2	12.00	10.00	8.00	6.00		5.00	3.50	3.00	5.00
New American House			10.00	5.00	5.00					3.00 4.00 Note 5
Oxford	12.00 Note 7	8.00 10.00 Note 7	8.00 10.00 Note 7	7.00	5.00		4.00		2.00	3.00
Parker House	17.00 Note 6		12.00 Note 7	7.00	5.50 6.50 7.00		3.50 4.50 5.00		2.50 3.00 3.50	3.50 4.00 4.50
Puritan's	16.00		10.00	6.00		5.00		4.00		
Putnam									1.00 1.50 2.00 3.00	2.00 3.00
Quincy House					7.00	6.00			3.00	4.00
United States					6.00		4.00		2.00 3.00	4.00
Young's				7.00	6.50		4.50			4.00

*Explanatory Notes.* 1. Bathroom not between bedrooms, suitable for men only. 2. Has all single beds, no double beds. 3. With bed in parlor accommodates 3 persons at \$7, \$8, \$9, \$10. 4. Same type for 3 persons at \$8, \$9. 5. Same type for 4 persons \$6. 6. Same type with 2 baths, \$18.50. 7. Has all double beds, no single beds.

### National Dental Association.

THE twenty-fourth annual meeting of the National Dental Association will be held in Mechanics Building, Boston, Mass., August 23 to 27, 1920.

The Mechanics Building is one of the largest in the United States for exhibition purposes of every description. It is over six hundred feet in length and covers over three acres of land, containing over 150,000 square feet of floor space, and is known all over the continent as the home of the far-famed poultry, automobile, and dog shows, mechanics' and food fairs. World-renowned opera singers have entertained thousands of music lovers in the Grand Hall. Presidents and noted speakers have addressed thousands of citizens of Massachusetts in this vast hall.

The Association is indeed fortunate to secure such a building for its meeting, as it assures ample room for clinics, demonstrations, and exhibits under one roof, with facilities for taking care of ten thousand members of the profession and guests.

F. E. JEFFREY, *Chmn. Pub. Committee*,  
Salem, Mass.

### South Carolina State Dental Association.

THE next annual meeting of the South Carolina State Dental Association will be held in Columbia, S. C., at the Jefferson Hotel, June 15th to 17th.

ERNEST C. DYE, *Sec'y*.

### Maine Dental Society.

THE annual meeting of the Maine Dental Society will be held at Old Orchard, Me., on June 23, 24, and 25, 1920.

B. C. GRAFFAM, *Sec'y*,  
Portland, Me.

### Northwestern University Dental School.

#### NOTICE TO ALUMNI.

OUR next regular Homecoming Clinic will be a two-day meeting, June 14 and 15, 1920. Clinics and lectures on some of our most important present-day professional problems will be given by men of ability and reputation. The program will be full and profitable. In addition we are to have a splendid banquet,

at which some interesting announcements for the university will be featured.

We extend an earnest appeal to every alumnus to attend the entire session.

JAMES L. MORLAN, *Sec'y*,  
1431-25 E. Washington st., Chicago.

### Florida State Dental Society.

THE annual meeting of the Florida State Dental Society will be held at Miami, Fla., on June 15, 16, and 17, 1920.

H. B. PATTISHALL, *Sec'y*,  
Jacksonville, Fla.

### The Thomas W. Evans Museum and Dental Institute School of Dentistry University of Pennsylvania.

#### NOTICE TO DENTAL ALUMNI.

THE University of Pennsylvania Dental Alumni will present a series of progressive clinics at the Evans Institute on June 11, 1920. A number of important subjects will be presented by some of the most eminent members of the profession. Mark off this date on your calendar now.

Very truly yours,

JAMES E. AIGUIER.

### Virginia State Dental Association.

#### CHANGE IN PLACE OF MEETING.

THE fifty-first annual meeting of the Virginia State Dental Association will be held at the Virginian Hotel, Lynchburg, Va., June 30 to July 3, 1920.

HARRY BEAR, *Sec'y*,  
410 Professional Bldg., Richmond, Va.

### Wisconsin State Dental Society.

#### GOLDEN JUBILEE MEETING.

THE fiftieth annual (Golden Jubilee) meeting of the Wisconsin State Dental Society will be held in Milwaukee, Wis., July 13, 14, and 15, 1920.

W. F. FAUST, *Sec'y*,  
308 North ave., Milwaukee, Wis.

### New Jersey State Dental Society.

THE annual meeting of the New Jersey State Dental Society will be a celebration of its fiftieth anniversary. It will be held on Young's Million Dollar Pier, Atlantic City, N. J., on July 14, 15, and 16, 1920. The

presence of men of national reputation will make it a memorable gathering.

Dr. W. W. Hodges, chairman of the Essay Committee, announces that Dr. Edward C. Kirk of Philadelphia, Dr. Otto U. King, secretary of the National Dental Association, Dr. John V. Conzett of Dubuque, Iowa, president of the National Dental Association, Dr. Thomas B. Hartzell of Minneapolis, and Dr. Wayne Babcock of Philadelphia, will present able papers.

Dr. Frank L. Manning, chairman of the Clinic Committee, has arranged for study classes to be conducted by Dr. John V. Conzett on Gold Inlays, Dr. John B. Hartzell on Pyorrhea and Prophylaxis, and Dr. Frederick Ream on the X-ray. In addition, general clinics will be given by men from the component societies, and also by clinical clubs.

Dr. Albert Kerr, chairman of the Exhibit Committee, is planning for the greatest display of dental goods and preparations ever shown at a dental convention. This exhibit alone will be worth visiting, and in conjunction with the other features will make the meeting the best in the history of the society.

All ethical practitioners are cordially invited to attend.

For a list of hotels or other information, address

F. K. HEAZELTON, *Sec'y*,  
223 E. Hanover st., Trenton, N. J.

### Colorado State Dental Board.

THE Colorado State Board of Dental Examiners will meet for the purpose of examining candidates for license to practice in Colorado, at Denver, Colo., at the State House, beginning June 1, 1920, at 8 A.M.

For further particulars and application blanks address

R. C. QUICK, *Sec'y*,  
310 Metropolitan Bldg., Denver, Colo.

### Iowa Board of Examiners.

THE Iowa State Board of Dental Examiners will meet for the purpose of examining candidates for license to practice in Iowa, at Iowa City, College of Dentistry, beginning Monday, June 7, 1920, at 9 A.M.

For further information and application blanks, address

C. B. MILLER, *Sec'y*,  
726 Fleming Bldg., Des Moines, Iowa.

### Michigan State Dental Board.

THE next meeting of the Michigan State Dental Board for examinations will be held at Dental College, Ann Arbor, Mich., June 14th to 19th. Anyone interested, communicate with the secretary.

B. S. SUTHERLAND, *Sec'y-Treasurer*,  
Owosso, Mich.

### Mississippi Board of Examiners.

THE next regular annual meeting of the Mississippi Board of Dental Examiners will be held in the Senate Chamber at Jackson, June 15, 1920, according to the State law. For further information address

B. J. MARSHALL, *Sec'y*,  
Marks, Miss.

### Oklahoma Board of Examiners.

THE next meeting of the Oklahoma State Board of Dental Examiners will be held June 7 to 12, 1920, in the Capitol Building (Senate Chamber) Oklahoma City. Oklahoma applications must be in at least ten days before examinations. Reciprocity has been canceled with all States.

L. M. DOSS, *Sec'y*,  
Oklahoma City, Okla.

### Virginia Board of Examiners.

THE next meeting of the Virginia State Board of Dental Examiners will be held in Richmond, at the Medical College of Virginia, beginning promptly at 9 o'clock, Tuesday, June 8, 1920. For further information and application blanks, address

J. LEWIS WALKER, *Sec'y*,  
505 Taylor Bldg., Norfolk, Va.

### Georgia Board of Examiners.

THE Board of Dental Examiners of Georgia will meet in Atlanta at the Piedmont Hotel on June 7, 1920, for the purpose of passing upon applicants for licenses to practice dentistry in Georgia. Those interested will please take notice.

Any additional information may be had by writing the secretary.

THOMAS COLE, *President*,  
Macon, Ga.

D. D. ATKINSON, *Sec'y*,  
Brunswick, Ga.



### Maryland Board of Examiners.

THE Maryland Board of Dental Examiners will meet for examination of candidates for certificates in Baltimore, at the Dental Department of the University of Maryland, on June 9 and 10, 1920, at 9 A.M.

For application blanks and further information, apply to  
F. F. DREW, *Sec'y*,  
701 N. Howard st., Baltimore, Md.

### New Hampshire Board of Examiners.

THE New Hampshire State Dental Board will hold its next meeting for examinations on June 30, July 1 and 2, 1920.

HARRY L. WATSON, *Sec'y*,  
913 Elm st., Manchester, N. H.

### North Carolina Board of Examiners.

THE next meeting of the North Carolina State Board of Dental Examiners will be held at Wrightsville Beach, Wilmington, N. C., beginning promptly at 9 o'clock on Saturday morning, June 19, 1920.

For further information and application blanks, address  
F. L. HUNT, *Sec'y*,  
Asheville, N. C.

### Connecticut Dental Commission.

THE Dental Commissioners of Connecticut will meet at Hartford, Conn., June 17, 18, and 19, 1920, to examine applicants for license to practice dentistry, to examine dental hygienists for license to practice, and to transact any other business proper to come before them.

For further information, address

EDWARD EBERLE, *Recorder*,  
902 Main st., Hartford, Conn.

### Florida Board of Examiners.

THERE will be a meeting of the Florida State Board of Dental Examiners June 11, 1920, at Miami, Fla., for the purpose of examining all qualified applicants who may come before them at that time. All applications should be in two weeks prior to the examination.

For further information address

R. P. TAYLOR, *Sec'y*,  
414-415 St. James Bldg., Jacksonville, Fla.

### Massachusetts Board of Examiners.

THE Massachusetts Board of Dental Examiners will hold an examination for registration June 14th to 18th inclusive. The practical examination will be held at Harvard University Dental Department, Longwood ave., Boston, Mass., commencing Monday, June 14th. Applicants must file their applications at least ten days prior to above date. Full information and application blanks may be secured by addressing

JOSEPH N. CARRIERE, *Sec'y*,  
352 Main st., Fitchburg, Mass.

### Rhode Island Board of Registration.

THE regular semi-annual meeting of the Rhode Island Board of Registration in Dentistry for the examination of candidates will be held in the State-house, Providence, R. I., June 29, 30, and July 1, 1920.

All applications with the proper fee must be filed one week previous.

For further information address

ERNEST A. CHARBONNEL, *Sec'y*,  
334 Westminster st., Providence, R. I.

### New Jersey Board of Registration.

THE State Board of Registration and Examination in Dentistry of New Jersey will hold their regular examination in the 2d Regiment Armory, Trenton, N. J., June 28, 29, and 30, and July 1 and 2, 1920. License fee, \$25; re-examination fee, \$10.

Practical tests required: Insertion of an approximal gold filling with the approximating tooth in position, compound approximal amalgam filling, and a silicate filling—candidate must furnish his own patient; taking of impression, bite, selection of teeth, articulation, trial plate—candidate must furnish his own patient; practical examination in mouth diagnosis.

Attention is directed to the following quotation from the dental law of New Jersey: "Applicant shall present to said board a certificate from the Commissioner of Education of this State, showing that before entering a dental college, he or she had obtained an academic education consisting of a four-year course of study or the equivalent thereof."

In accordance with this law the secretary will issue application blanks only upon presentation of the required certificate from the Commissioner of Education, State-house, Trenton, N. J.

Applications must be filed complete ten days before the date of the examinations. Address all communications for further particulars to  
JOHN C. FORSYTH, *Sec'y*,  
429 E. State st., Trenton, N. J.

### Wisconsin Board of Examiners.

THE next examination of the Wisconsin State Board of Dental Examiners will be held in Milwaukee, Wis., beginning June 21, 1920.

All applications and credentials must be in the hands of the secretary at least ten days before the examination. Full information and application blanks may be received by addressing  
WILLIAM KETTLER, *Sec'y*,  
801—3d st., Milwaukee, Wis.

### Illinois Department of Registration and Education.

THE Department of Registration and Education of Illinois will hold an examination for dentists in Chicago the week commencing Monday, June 21st. Complete application and examination fee of \$20 must be on file in this office by June 10th. For application blank and further information, address

F. C. DODDS, *Supt. of Registration*,  
Springfield, Ill.

### Nebraska Board of Examiners.

THE next examination of the Nebraska Board of Examiners will be held June 8 and 9, 1920, in Omaha, and in Lincoln, on June 8th, 9th, 10th, 11th, and 12th. The examination in practical work will be June 8th and 9th, at Creighton University, Dental Department, Omaha, and at the University of Nebraska, College of Dentistry, Lincoln. The written examination will be given June 10th, 11th and 12th, at the State-house, Lincoln.

Applications should be on file with this department not later than May 24th.

H. H. ANTLES, *Sec'y*,  
Lincoln, Nebr.

### South Dakota Board of Examiners.

THE next meeting of the South Dakota State Board of Dental Examiners will be held in Sioux Falls, S. D., June 23, 24, 25, and 26, 1920, beginning promptly at 1 P.M., June 23d. All applications must be in the hands of the secretary a week before examination. Fee for examination, \$25; no reciprocity or interchange.

Full information and application blanks may be had by addressing

LYLE S. SPENCER, *Sec'y*,  
Watertown, S. D.

### Vermont Board of Examiners.

THE next meeting of the Vermont Board of Dental Examiners for the examination of candidates to practice in Vermont will be held at the State-house, Montpelier, June 28, 29, and 30, 1920. Candidates will present for registration and preliminaries at 10 A.M., Monday, the 28th.

To be eligible for examination a candidate must be (1) twenty-one years of age, (2) a graduate of a high school of the first class, (3) a graduate of a reputable dental college. Applications must be in the hands of the secretary not later than June 21st.

For further information and application blanks, address

HARRY F. HAMILTON, *Sec'y*,  
Newport, Vt.

### California Board of Examiners.

THE next meeting of the Board of Dental Examiners of California for the purpose of examining applicants for license to practice dentistry in that State will be held in the city of San Francisco, beginning on June 21, 1920, at 9.30 A.M. Each applicant shall file with the secretary of the Board fifteen days before that date the following credentials: (1) diploma or certificate of graduation from a reputable dental college approved by the Board; (2) a diploma from an accredited high school or a certificate signed by the State Superintendent of Public Instruction (or similar officer), to the effect that the applicant has had scholastic preparation equivalent in all respects to that demanded for graduation from a high school giving a four-years' course of instruction. In lieu of high-school credentials, an applicant, who has been a licensed

practitioner of dentistry of some other State of the United States for a period of at least five years, shall file such license or licenses which will be accepted; (3) a testimonial of moral character; (4) a recent unmounted photograph.

For further information, address

C. A. HERRICK, *Sec'y*,  
133 Geary st., San Francisco, Calif.

### Pennsylvania Board of Examiners.

THE next meeting of the Board of Dental Examiners of Pennsylvania will be held in Philadelphia and Pittsburgh, on Wednesday, Thursday, Friday, and Saturday, June 23, 24, 25, and 26, 1920. The theoretical examina-

tions will be held at Musical Fund Hall, 808 Locust st., Philadelphia, and at the College of Pharmacy, Bride and Bluff sts., Pittsburgh. These examinations will begin on Wednesday, June 23d, at 9 A.M., and will continue Thursday and Friday. The examination in practical work will be held on Saturday, June 26th, at 8.30, and will be held at the Evans Institute, Fortieth and Spruce sts., Philadelphia, and the University of Pittsburgh, Pittsburgh.

Application papers may be secured from the Department of Public Instruction, Harrisburg. For further information apply to

ALEXANDER H. REYNOLDS, *Sec'y*,  
4630 Chester ave., Philadelphia.

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# UNITED STATES PATENTS

## PERTAINING TO OR APPLICABLE TO DENTISTRY

### ISSUED DURING MARCH 1920.

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#### March 2.

- No. 1,332,415, to SIGMUND A. SIGEL. Removable porcelain cap or cusp for dental work.
- No. 1,332,466, to ELOF T. HEDLUND and STANLEY E. NOYES. Artificial teeth.
- No. 1,332,744, to JOSEPH F. NELSON. Right-angle handpiece for dental engines.

#### March 9.

- No. 1,332,878, to EVERETT BARD. Dental appliance.
- No. 1,333,007, to ROBERT M. WITHYCOMBE. Artificial tooth.
- No. 1,333,054, to JAMES H. ABBOTT. Dental mandrel.
- No. 1,333,388, to WILLIAM E. CHESTER. Dental drilling tool.
- No. 129,890, to STEGER and COMPANY. Trade-mark for tonic for the bones, teeth, blood, and nerves.
- No. 129,948, to TSURUJIRO YOSHITAKE. Trade-mark for dentifrice or tooth-powder.

#### March 16.

- No. 1,333,804, to ISAAC M. HAIR. Artificial tooth.
- No. 1,333,809, to WILLIAM J. LAURER and Jos. O'HALLORAN. Dental-engine head.
- No. 1,334,119, to ALBERT H. SMITH. Interchangeable tooth.

#### March 23.

- No. 1,334,770, to GEORGE R. MARTZ. Tooth-brush.

#### March 30.

- No. 1,335,250, to EDWARD LIPPERT. Tooth-brush and paste holder.
- No. 1,335,372, to ENOCH M. FREDERICKS. Process and means for making artificial crowns for teeth.
- No. 1,335,413, to JAMES H. ABBOTT. Means for applying dental treatments.
- No. 1,335,681, to FRANK C. GOODWIN. Bridge tooth.
- No. 1,335,689, to LOUIS KARAS. Toothbrush.



# THE DENTAL COSMOS

VOL. LXII.

JUNE 1920.

No. 6

## ORIGINAL COMMUNICATIONS

### The Removable Lingual Arch and Its Relation to the Orthodontic Problem.

By J. V. MERSHON, D.D.S., Philadelphia, Pa.

(Read before the Pacific Coast Society of Orthodontists, San Francisco, February 17, 1920.)

**I**N general the normal development of any part is dependent upon its proper nutrition, and this is dependent upon the functional activity of this and other related parts." (Conklin, "Heredity and Environment.")

Until recently orthodontia has been studied as a tooth problem, taking into account the size and shapes of the teeth together with arch form and cusp relationship, and the theory has been evolved that teeth moved from malocclusion to normal occlusion and with proper relationship of the cusps and inclined planes established, the mechanical relationship, by virtue of the mechanical locking of the cusps and inclined planes, will cause these teeth to remain in position of normal occlusion.

From this theory one would be led to believe that cusp relation is a primary force and a controlling one. This would be true if the teeth were implanted in a piece of metal which is fixed so that no

change could take place in the supporting structure or if the teeth in the opposing jaws were held rigidly in occlusal contact by well-developed muscles. But the bone supporting the teeth is plastic in nature, subject to many influences and constantly changing, and the muscles which hold the teeth in occlusion are not rigid, but to the contrary in most of our patients are very flabby and relaxed. Too frequently this theory fails and the teeth drift to their former positions. So frequently indeed is this true that the orthodontist is continually groping for a remedy for his failure, and he has gone but little farther than the field of orthodontic appliances. While there is no doubt that some appliances are more efficient than others and some men are better technicians than others, it is my belief that the solution of our problem will never be found simply by the use of orthodontic appliances.

We must approach the problem from an entirely different angle. Primarily, the orthodontic problem is not a tooth problem and, consequently, is not primarily a problem of occlusion, but it must be studied from the standpoint of development and its relation to the functional forces.

"One of the greatest and most far-reaching themes which has ever occupied the minds of men is the problem of development." (Conklin.) It is well known in biology that all form depends on function and our problem is essentially a study of form. The human body is composed of certain well-known tissues, and very early in our life's history these tissues through certain functional changes are formed into organs, and it is through the function of these tissues and organs that we have the developing human body. Most of the organs and tissues of the body are developed under their own function.

There is a definite functional relationship between organs and tissues, so is there a functional relationship between the different organs. If one organ of the body should partially fail in its function, it would have a retarding influence on other organs associated with it; so with this interdependence of organs we have the body as a whole developed perfectly or imperfectly according to organ function. "The human body is an exceedingly complex structure. Many organs must originate, grow, develop, and be co-ordinated and adjusted in one body. We often forget or underestimate the importance of growth. If an organ is undersized it is a source of weakness in the body. This is evident of heart and lungs, but equally true of all organs. Bone and muscle must grow well in the child before they can be developed and hardened by the boy and girl." (Tyler, "Growth and Education," page 55.)

In our study of the oral cavity as an organ, we must study it in its relation to the other organs of the body. It is affected in its growth and develops just in proportion as we have normal or abnormal function of the associated organs.

The teeth are peculiar in that they lack the power of repair and are fully formed before they begin to perform the function for which they were designed. It is not until they are fully formed and erupted into occlusal contact, that they become an active functional factor in general development. Through the interrelationship with the muscles of mastication and the supporting bones the development of the tooth in its bony crypt is a normal function, and a factor in bone development prior to and during its eruption in so far as it is part of nature's original plan. The negation of this is evident in the lack of development seen when teeth are congenitally missing. The tooth on erupting has no power of directing itself into normal occlusion; it can only occupy such position in the dental arch as the associated tissues together with the developing bone in which it is located place it. The malposition of a tooth may be largely established before the tooth starts to erupt. So for these reasons I claim that primarily the orthodontic problem is not a tooth problem, but that malocclusion is undoubtedly the result of a functional disturbance in bone development together with its associated tissues.

The teeth depend on the osseous tissues for their support and to hold them in occlusion whether in normal occlusion or malocclusion. Tooth occlusion is secondary or a symptom indicating only to a degree the variations in the development of the bones of the mandible and maxillæ. Our problem is a much larger one than simply moving teeth into normal occlusion with an orthodontic appliance, and we will have to look for help in many of our cases in some other field of medical science.

Is it possible to correct all cases of malocclusion? Can we correct all cases and retain the teeth so that they will not relapse? Is it reasonable to assume that in a case of faulty development of both mandible and maxillæ in a child with very narrow arches and teeth badly crowded, with flabby muscles, anemic, generally poorly developed and underweight, we can restore with orthodontic



appliances such a mouth to 100 per cent. perfect and retain it with the rest of the child only 80 per cent. normal in its development? In spite of the fact that we cannot do so, we are still using orthodontic appliances and will continue to use them.

While orthodontic appliances will continue to be indispensable, so long as in the nature of the circumstances we are compelled to correct malocclusion by mechanical means, a proper comprehension and appreciation of the underlying principles of development involving the relationships of function to form must necessitate the use of orthodontic appliances so constructed and adapted that they shall become auxiliary to and co-operate with the developmental forces involved in the orthodontic procedure and not obstruct or hinder their normal action.

In the selection of an appliance to produce bone development and tooth movement, we must remember there is an interrelationship of function between the teeth and the peridental membrane, the bones supporting them, the muscles of the oral cavity, the nervous system and the circulation. The appliance to produce the proper stimulus to the tissues supporting the teeth to be moved, must do it in such a way that this interrelationship of function will not be disturbed. Each tooth is a unit and a law unto itself, having motion by virtue of the peridental membrane, which becomes operative in mastication, and through the action of the lips, cheek and tongue. This motion in turn reacts on the bone and its supporting tissues. If this motion is denied the tooth by a rigidly attached appliance, the supporting bone degenerates because the bone and tooth are robbed of their function; or when an appliance with which the tooth is being moved is so rigidly attached to the tooth that the movement is a positive one and the tooth is entirely under the control of the appliance, it destroys the functional relationship between the tooth and the rest of the tissues, and when the appliance is removed the tooth function is so disturbed that the tooth will not remain in

its new position. By virtue of this functional interference, an unbalanced functional force is established which is very difficult to overcome, and we have difficulty in retaining the tooth in the position to which we have moved it. In selecting an appliance, the first requisite is that it must not interfere with the function of the teeth or any of the associated tissues or organs of the oral cavity.

As our problem is a developmental one due to functional disturbance, before we attempt to direct development in the dental arches of growing children, we must know the direction in which the development is taking place. In our efforts to produce growth by pressure artificially applied to the teeth with a mechanical appliance, so that by bone development these teeth may be carried to their correct positions according to our standards of occlusion, the amount of pressure to apply is rather difficult to determine. Of course the ideal would be that amount which corresponds with the normal growth force in developing bone, but this we have no means of measuring; so the smallest amount of pressure we can apply and control, which will cause bone development and cause the tooth to change its position, would approximate the normal force of development as closely as it is humanly possible to estimate it.

Since development in the dental arches is a general enlargement forward and outward and occlusally, this would indicate that if we place an appliance on the lingual surfaces of the teeth we at least would not interfere with development, as the normal direction of growth would be away from an appliance so placed. When we apply gentle pressure to a tooth sufficient to stimulate bone growth and tooth movement, after the tooth has moved beyond the influence of the appliance growth does not suddenly stop but continues for a long time as the result of the stimulus received from the appliance. It can be readily seen therefore that an appliance rigidly attached to the buccal and labial surfaces of the teeth would have a retarding influence



on this continued growth and tooth movement.

#### DEVELOPMENT OF THE REMOVABLE LINGUAL ARCH.

With these thoughts in mind, I wish to present for your consideration the removable lingual arch, which closely approaches the ideal appliance in accordance with our modern conception of tooth movement in form development. The removable lingual arch is an arch wire of suitable size adapted to the lingual surfaces of the teeth. It is attached by means of a lock to metal bands cemented on the anchor teeth, usually the first molars, through which with its various auxiliary spring attachments stimulation is applied to the teeth causing developmental changes and tooth movement.

With me the lingual arch used removably has been and still is in the evolutionary process. I first used it in January 1909. At that time it was used with round horizontal tubes soldered on the lingual surfaces of the molar bands with the distal end of the tube closed, and I am at times still using them. With this style of tube it was very difficult to remove and replace the arch wire. To overcome the difficulty, a round vertical tube was used locking the arch wire in the same manner as it is done today. The tendency with the tube thus used was to rotate the molar teeth even though the arch wire was extended well back on the molar band. When Drs. Angle and Young brought out the Young-Angle lock, using an elliptical vertical tube on the molar band, that helped to solve the problem, but the post would move in the tube and again it would cause the molars to rotate slightly. To overcome this I developed the half-round tube, which I used first in June 1915, and have been using it on molar bands for the purpose of attaching the lingual arch ever since.

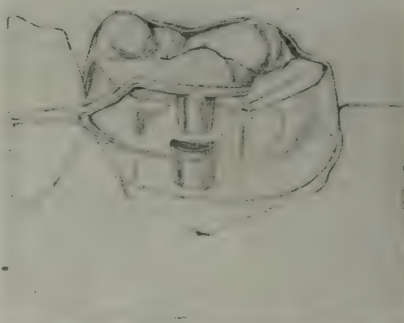
#### DESCRIPTION OF THE LINGUAL ARCH.

The arch consists of one large main wire, a lock, of which the main wire is a

part, and auxiliary springs. The lock (Fig. 1) is composed of the half-round tube soldered to the molar band in a vertical position, a post which accurately fits the half-round tube soldered to the main arch wire, and a smaller wire, soldered to the main arch wire, passing under the half-round tube, locking the arch in place; this latter we call the lock wire.

The materials used in the construction of the main arch, the auxiliary springs, and the lock, the half-round tubes and posts are all alloys of gold and platinum,

FIG. 1.



which possess great spring, that is retained over a long period of time under stress, and can be readily softened and retempered again. Several of the manufacturers have produced alloys possessing these qualities.

In selecting the material and the sizes of wire, use the smallest possible variety of material and standardized sizes. For the main arch wire 36/1000ths or No. 19 gage B. & S. after long experience has been adopted; for the lock wire 26/1000ths is the best size; for the auxiliary springs after many tests 22/1000ths has proved without doubt the proper size. The half-round tubes I have used in many different lengths, but have at last decided on one size exclusive of all others, namely, 8/100ths of an inch. The half-round wire, which comes in six-inch or foot lengths, should of course always fit the tubes accurately. If it

does not fit accurately do not use it, as it will cause trouble later on.

#### CONSTRUCTION OF THE ARCH.

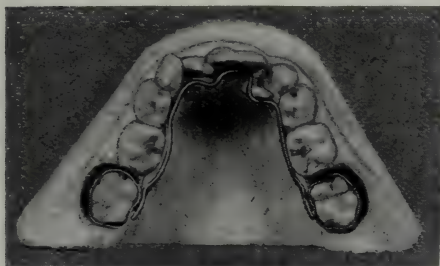
The arch is constructed on a plaster model with molar bands which have been fitted to the natural teeth, with half-round tubes soldered to their lingual surfaces and transferred to the corresponding teeth on the plaster model. The main arch wire is then bent to conform to all the inequalities in the dental arch produced by the irregularities of the teeth, and should extend distally beyond the half-round tubes one-eighth of

model, it can readily be brought to place by heating this spot to a cherry red and while hot pressing it home with a suitable instrument and holding it there until it sets. The arch is again removed from the model and the lock wire is soldered to the main arch wire, just mesial to the post and bent to pass gingivally to the tube where it is cut off. The arch is now ready to be placed in the mouth.

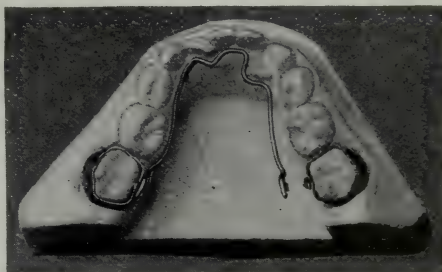
#### PLACING THE ARCH.

Remove the anchor bands from the model and cement them on the teeth. In

FIG. 2.



A



B

A. Showing correct position of lingual arch; B, showing incorrect angle of the post.

an inch. Slightly mesial to the tube we make a slight step in the wire by bending it first toward the gingiva, then again parallel with the gingiva. Place the arch wire very carefully in its correct position on the model and with a sharp instrument mark the arch wire opposite the tubes, then proceed to solder, free hand, the half-round post wire to the main arch wire opposite the marks, cutting it off the proper length for the half-round tubes. We now place one of the posts in the tubes. Should it not lie correctly on the model, remove the arch, and with two pairs of Dr. Young's pliers it can be twisted to its desired position. Proceed with the opposite side in the same manner. Replace the arch with both sides in the tubes. Should any part of the arch stand off from the

trying the arch in the mouth, grasp the arch on the left side in the region of the half-round post with a pair of How pliers, and place the post in the tube on the left side. The arch should lie in its proper position, with the half-round post on the opposite side parallel with the half-round tube (Fig. 2A). Should it not, twist or bend the arch until it lies correctly. Remove the post from the tube on the left, then place the right side post in the tube. If the post on the left side drops into place with the tube, then the arch is ready to be locked in place.

#### LOCATION OF HALF-ROUND TUBES.

The tubes should be placed on the lingual surfaces of the anchor bands, usually in the center of the band mesio-



distally in both upper and lower jaws. In the lower jaw they should be placed as near the occlusal edge of the band as possible, allowing only sufficient distance between the occlusal edge of the band and the top of the tube for the arch. The tubes are so placed for the reason that the post is easier to place in the tube; if it is too far toward the gingiva, it is difficult to see the tube in the lower jaw on account of the tongue and saliva. In the upper jaw the tube should occupy the same position mesio-distally, but should be placed as near the gingiva as possible, otherwise the lingual cusps of the lower molars will come in contact with the arch and the continuous biting on it will eventually cause the arch to break.

#### PROPER LOCATION OF THE ARCH.

The arch should occupy a position on the lingual surface of the teeth as close to the gingiva as possible. The arch when first placed in the mouth should be passive, the patient being allowed to wear it long enough to become entirely accustomed to it, usually a week. During this period children are more likely to play with the arch with the tongue and fingers than thereafter. Therefore very strict caution should be given both patient and parent regarding this evil, as well as against eating sticky candy. After these precautions I seldom have trouble, but should I have, at the next visit I wire the arch with a fine ligature wire to some favorable tooth, and this usually cures the trouble after the patient becomes accustomed to the arch.

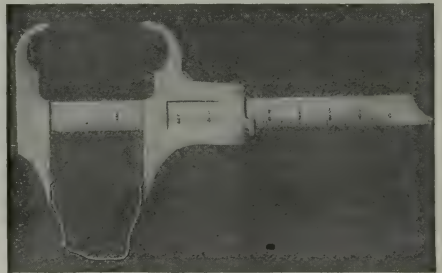
#### USE OF THE ARCH.

The force necessary to produce tooth movement with the lingual arch is obtained in three ways: first, by straightening out the inequalities in the arch wire; second, by auxiliary springs soldered to the main arch; and third, by stretching the wire by means of the wire-stretching pliers.

At the next visit after placing the arch in the mouth, which is usually the

next week, the arch is removed from the mouth. This is accomplished by taking a suitable instrument and bending the lock wires from under the tubes on both sides, and the posts teased out of the tubes. With a pair of calipers, such as shown in Fig. 3, measure the distance from one half-round post to the one on the opposite side. This is absolutely necessary, especially if we intend to make a change in the main arch before replacing the arch, being sure to remeasure to see that the distance from one post to the other is the same as when removed. At times it is wise to take a measurement in the region of the first bicuspid as well. If you are treating the case by taking the

Fig. 3.



inequalities out of the main arch, which were made to fit around malposed teeth, a pair of flat-nosed pliers are best adapted for this work. In taking out a curve that fits around a tooth make but little change each time, remembering that you are only stimulating growth, not pushing the tooth. In removing a curve from the arch it not only causes the arch to bear a little harder on that particular tooth, but it slightly enlarges the whole circle of the arch.

#### THE AUXILIARY SPRING.

The auxiliary spring is a small wire soldered to the main arch wire for the purpose of applying a gentle pressure to a tooth. The spring (Fig. 4) is usually soldered to the gingival side of the arch, and at right angles to the main arch, using 14-k. solder, then bent in the



direction in which we wish to apply force. The reason for soldering the spring at right angles to the arch and bending it is that, in soldering, the high

FIG. 4.

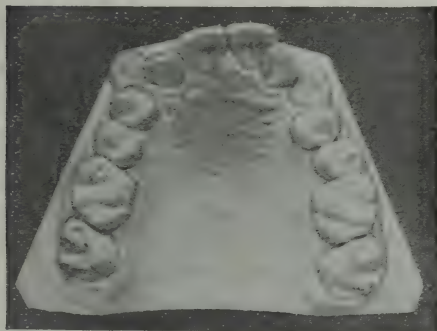


heat, especially with a high karat solder, removes the temper from the wire, while the bending to correct position restores the spring temper.

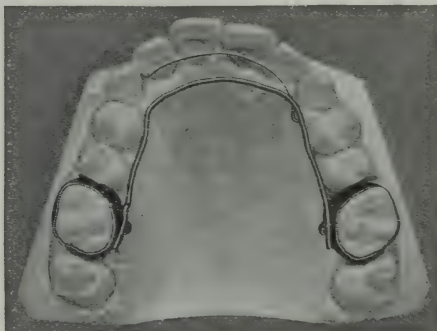
spring made of springy wire, 22/1000ths, properly attached to the main arch as a method of applying a stimulus to the teeth for the purpose of producing development and tooth movement very closely approaches the normal functional forces of development, and it has been my experience that teeth properly moved by use of the auxiliary spring have not the tendency to return to their former positions.

The most of our work in orthodontia consists in the treatment of under-developed or mal-developed dental arches, and we have two well-known conditions to deal with in many of our Class I cases: one in which the lateral teeth are almost in contact with the first bicusps on one or both sides, leaving the cuspid teeth labially placed and very conspicuous; and second, a type where the arches are very narrow, requiring development in the bicuspid and cuspid regions. For both of these types the auxiliary spring is most efficient. The forward development of the anterior teeth we accomplish in two ways: first, by attaching a spring to the gingival

FIG. 5.



A



B

Showing the case before (A) and after (B) the use of the spring.

The longer I use the lingual arch, the more I find myself using the auxiliary springs for development and tooth movement, using the main arch to follow up and bring about the general conformation of the dental arch. The auxiliary

side of the main arch opposite the first bicuspid teeth at right angles to the main arch (Fig. 5B), then bending the spring forward in a very short bend forming a small loop, and curving it around to correspond to the anterior curve in the

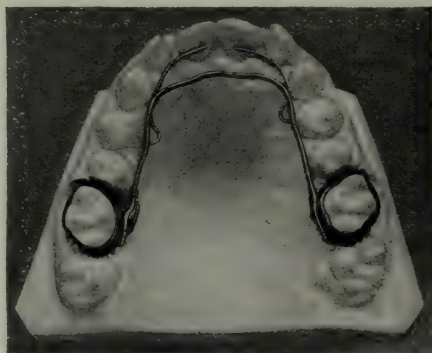
main arch, allowing it to extend so that it will engage the lateral tooth on the opposite side. Another method is to use two springs attached to the main arch,

with the main arch wire, almost to the first molar, then make a short loop bending it again toward the cuspid tooth and leaving it as long as required according

FIG. 6.



A



B

Showing the case before (A) and after (B) the use of the springs.

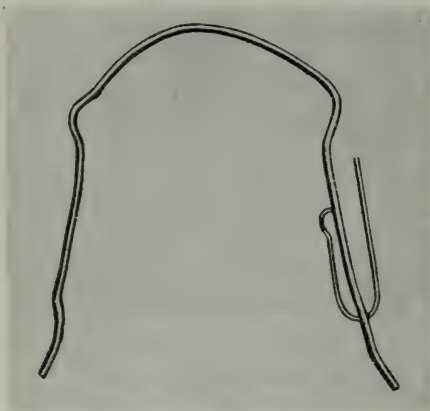
one on each side opposite the bicuspid teeth, bending them forward to engage the lateral and central incisors on their respective sides (Fig. 6B).

to number of teeth to be moved. This gives us a compound loop in which the pressure is the same on all the teeth (Fig. 7).

#### ROTATING TEETH.

The auxiliary spring is most efficient for rotating teeth. To produce rotation without banding the tooth, let us take as an example the upper first bicuspid, which frequently erupts with the lingual cusp rotated mesially (Fig. 8). This is very easily corrected by soldering a spring to the main arch, opposite the approximal space between the first and second bicuspids. Bend the wire mesially, forming a half circle, with the free end of the spring wire engaging the first bicuspid and applying pressure on the mesial surface opposite the lingual cusp. The same principle of attachment can be employed for moving teeth mesially or distally, also for the purpose of opening spaces.

FIG. 7.



To produce lateral development in the bicuspid and cuspid region, we attach the spring to the main arch wire opposite the space between the first and second bicuspids, bend the wire distally, parallel

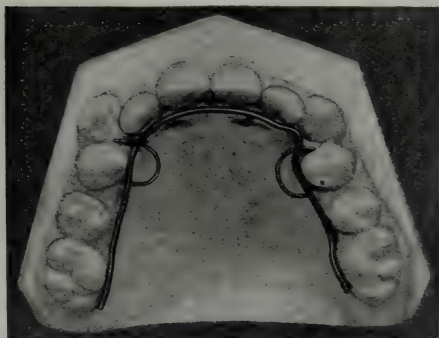
#### TO OPEN SPACES FOR IMPACTED OR MISSING TEETH.

This is accomplished by the use of two auxiliary springs soldered to the arch,

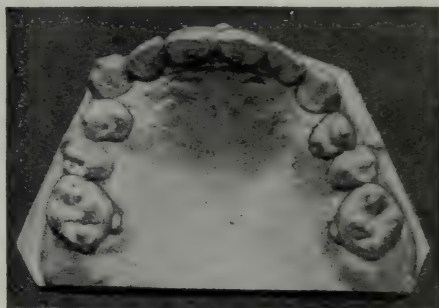
one the width of a tooth distal to the place we wish the space, attaching the springs the width of two teeth apart. The one most distal curves mesially to

loose end, which should always be flattened by diskings both sides until it is very thin, to the gingival side of the arch, and if properly adjusted (this is

FIG. 8.



A



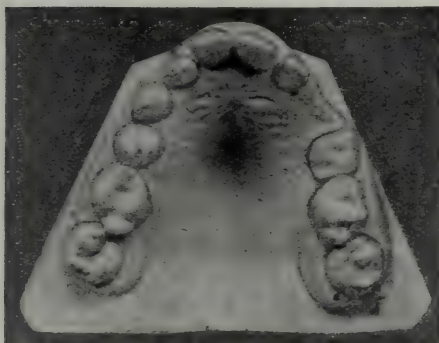
B

A, With springs in position; B, showing result of the use of the springs.

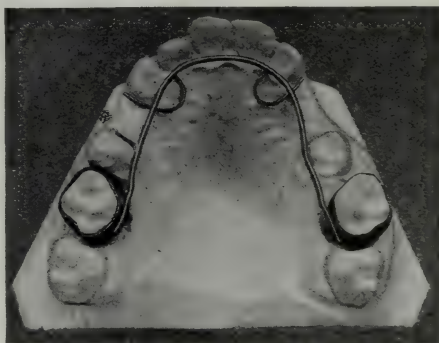
engage the tooth distal to the space (Fig. 9B). With the loose end of the spring flattened by diskings the sides, this end usually passes to the gingival side of the arch to engage the teeth.

most important in all of the auxiliary springs) it will pass between the tooth and the soft tissues at the gingival space in the same manner as a thin band. Tooth movement is very easily accom-

FIG. 9.



A



B

Showing the case before (A) and after (B) the springs were in position and the result.

To move the anterior teeth mesially or distally, solder a spring to the arch about fifteen one-hundredths of an inch distal to the tooth to be moved (Fig. 10). Bend the spring in a curve, passing the

plished if slight pressure is applied to the tooth by tightening the spring from time to time.

One of the most successful methods for rotating teeth is to band the tooth to



be rotated in the usual way, with a spur attached to the labial side of the band (Fig. 11A). With a spring wire soldered to the arch some distance from the tooth to be rotated, bend the spring al-

slip off. The tendency of the spring wire to return to its original position will cause the tooth to turn on its axis.

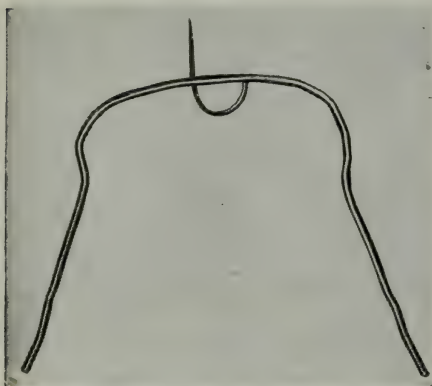
#### AUXILIARY SPRINGS.

I have only mentioned a few ways in which the auxiliary springs may be employed; however, there is no limit to their use and the variety of methods of employing them. The auxiliary spring wire should always be as long as we can control it, as the pressure is more gentle, and it will be surprising to see what a slight stimulation is required to produce bone change (Fig. 12). At times the auxiliary spring may cause the main arch to be pushed occlusally. In such a case the main arch wire should be stabilized by ligating it to a tooth favorably placed.

#### ANCHORAGE.

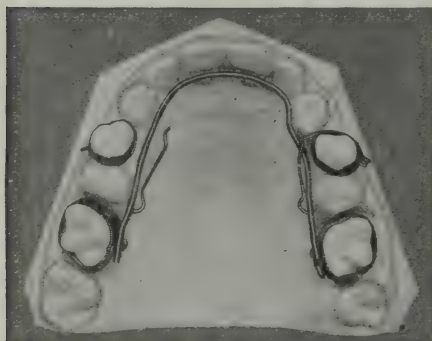
A word of warning regarding the anchor teeth. There may be times when it will be necessary to band an anterior tooth or in some other way to stabilize the anchor teeth, but very seldom. If we are interfering with our anchor teeth,

FIG. 10.



most parallel with the main arch. On the loose end, which should now stand some distance from the arch, place a fine ligature wire, which, passing through the gingival space, engages the spur on the

FIG. 11.



A



B

Showing the case (A) with springs in position, and (B) the final result.

band. After this the ligature wire should be tightened until the spring is in contact with the main arch. It is well to make a hook at the end of the spring wire so that the ligature will not

it is evident we are applying too much pressure and undertaking to produce tooth change faster than development will take place. Almost every one in beginning to use the lingual arch applies

too much force and adjusts the arch entirely too often.

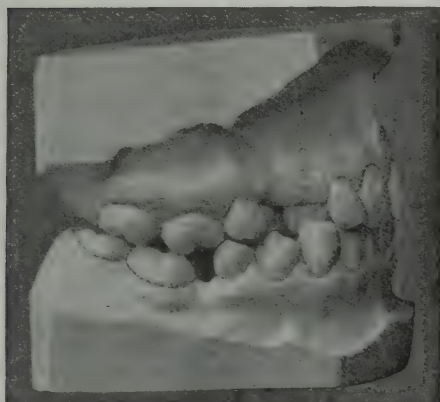
#### FREQUENCY OF ADJUSTMENTS.

Adjustments in the lingual arch, unless for some special condition or reason, should not be more frequent than one every four to eight weeks. We are treating growing children in whom nature through some functional disturbance has failed to develop the dental arches according to our conception of normal

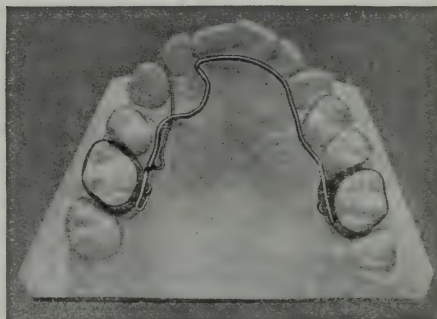
a normal harmonious functional development.

"A general characteristic of protoplasm is the capacity of storing up or registering the effects of previous stimuli. A single stimulus may produce changes in an organism which persist for a longer or shorter time, and if a second stimulus occurs while the effect of a previous stimulus still persists, the response to the second stimulus may be very different from that to the first." (Conklin.)

FIG. 12.



A



B

A, Showing inlocked cuspid; patient twenty-five years of age. B, Tooth brought out with spring.

form. In a child we should not undertake to stimulate development and tooth movement faster than normal growth would take place in a healthy growing child; otherwise, we will undoubtedly destroy the harmony of function between the tooth and its supporting bone, and establish an unbalanced functional force which is very difficult to correct; and we wonder why our cases relapse. Growth continues long after the appliance has spent its force and the teeth will continue to move for a considerable time as the result of this stimulation transmitted through the teeth to the bone cells with the appliance, the teeth frequently moving entirely free from the appliance. This is what I would call

If we would only remember that teeth move through a process of growth, that the appliance does not push the tooth, and that there is always an effort on the part of nature to move the tooth into its correct location! Place an appliance on the teeth of a skull and apply pressure; the teeth will not move. Why? Because there is no growth taking place.

Growth is the result of life. We cannot handle the orthodontic problem entirely to our own liking and make development adapt itself to whatever appliance we see fit to use, but we must adapt our appliance to the laws governing growth and development. There are certain laws governing growth. Function is the result of the active force in

growth, development is growth plus function, and form is the result of growth plus function, plus development.

With our appliance we do not manufacture growth; we only stimulate an already living, growing, human being. In the past there has been entirely too much tinkering done with the dental arches. I have many patients wearing lingual arches during the vacation season whom I do not see for three months, and when they return the development in the dental arches is so great that the appliance is very loose in the mouth and not in contact with the teeth at all. In the average case that I treat, taking the whole period of time they are under my care, I leave the appliances off almost as much as the child wears them, allowing the whole dental machine to develop under its own function and not by artificial stimulation.

#### RETENTION.

When teeth have been moved from malocclusion to normal occlusion and the proper cusp relationship established the mechanical locking of the cusps of the teeth is supposed to retain them in this position, but on removing our retaining appliance those teeth frequently return to their former position. If mechanical locking by means of this cusp relationship is such an important factor, why do these teeth relapse? The teeth themselves have no power by which they can retrace their steps. Our deduction then would be that we have a force operating in the tissues supporting the teeth which causes them to relapse to their former position, and that these forces supporting and surrounding the teeth, if I may so call them, are greater forces than the mechanical locking of the cusps.

I do not mean to discount the value of cusp relationship, for it is absolutely necessary, but I do mean to say that it is not the controlling factor in retaining a denture in normal occlusion where the teeth have been moved from malposed positions. All forces are important and essential but we must have a harmony established between all the forces which operate or functionate. So in moving teeth with an appliance we must use the utmost care to see that the functional relationship between the tooth and the bone supporting it with its associated tissues has not been disturbed.

#### CONCLUSIONS.

Our problem is one of development; it is a study of growth and the functional forces of growth which control development; the teeth and their occlusion are an incident thereto. We are treating impaired function which results in defective development, and we are erroneously endeavoring to do it artificially with a mechanical appliance.

In recommending the removable lingual arch for this purpose, it is not to be considered a universal appliance, and is at times used in connection with the labial arch, especially in Class II and Class III cases. The making and using of the lingual arch are most difficult, but it is a most efficient appliance if properly used. With the lingual arch and the auxiliary springs we can apply a pressure to a tooth which approaches the normal growth force as closely as it is humanly possible to judge, so that we can produce development and tooth movement without destroying the harmony of function between the tooth and its supporting tissues.

1520 SPRUCE ST.



# The Teeth as a Source of Systemic Infection.

By JAMES W. HUNTER, Jr., M.A., M.D., Norfolk, Va.

(Address delivered before the Tidewater Dental Association, Norfolk, Va., February 12, 1920.)

WHEN William Hunter<sup>1</sup> in 1898 addressed the Odontological Society of London on "The Relation of Dental Diseases to General Diseases," that society promptly adjourned upon the usual pretext that, as the hour was late, the discussion would take place at another sitting. But the discussion begun as the result of that meeting has continued ever since. Indeed at no time more than at the present is its logic truer to its believers or its fallacies more proclaimed by a mass of reactionaries. It is the anchor of the internist. It has been heralded from the house tops. The public sense is aroused. And foolish indeed is the professional man who will not delve into and ponder well its teaching.

In the memorable communication to which we have alluded, Hunter gives as the reason for his address a series of observations and, though as yet he has been unable to confirm them, he thinks his conclusions rational. He has been at work upon his theory for some ten years. He evokes the authority of distinguished foreigners. He is convinced that the severe anemias are due purely and simply to oral sepsis. This communication is, therefore, only a preliminary one. He is searching. He is yearning for the truth. A little later he becomes bolder. He is more convinced. In his paper<sup>2</sup> on "Oral Sepsis as a Cause for Disease" he considers pyorrhea and abscesses of the teeth the cause of many of the general diseases and mentions "tonsillitis, glandular swellings, middle ear suppuration, maxillary abscesses," also "ulcerative endocarditis, empyemata,

meningitis, osteomyelitis and other septic conditions." Verily, a Pandora's box!

## HUNTER'S INDICTMENT OF DENTISTRY.

But it was in his address<sup>3</sup> in Montreal in 1910 that he reached the climax of his work. Like Paul upon the road to Damascus he is now thoroughly convinced. His eloquence is not less remarkable than that of the great apostle. His communication is most scathing. He declares that in his experience almost all of the germs to which our human ills are due are admitted by the mouth or nasal passages. It is by the products of oral sepsis that our systems are attacked. He upbraids the family physician. He declares that the ills arising from bolted food are less than those arising from pus mixed with food well masticated on imperfect teeth. He upbraids the patient so fond of his oral jewelry. But, most of all, he upbraids the so-called conservative or American dentistry. Hunter continues:

When looking in the mouths of his patients the doctor has often occasion to note incidentally the presence of defective or decayed teeth, as a general accompaniment and apparently as a part result of the poor health, poor nutrition, or wasting diseases from which they suffer. These defects of the teeth are so common that he has ceased to worry about them. He has often asked his patients, How can they expect their digestion to be good? What else but indigestion can they expect if they will not have their teeth "put in order" by the dentist, or get the dentist to supply new ones? How can they expect to masticate their food properly with such defective teeth? But, as he may sorrowfully

add, patients are "hopeless" in this matter; they will not "attend to" their teeth; not only so, they are actually "touchy" on the subject. The patient is quite willing to describe and discuss with the doctor all his other troubles and complaints, to which, as he says, he is a "martyr"—his indigestions, headaches, liver troubles, his rheumatism, his gout, and his "neuritis." But the subject of his teeth is his own affair, one between himself and his dentist. And the doctor regards it as such. "It is a matter of teeth and dentistry," with which he cannot deal.

No one has probably had more reason than I have had to admire the sheer ingenuity and mechanical skill constantly displayed by the dental surgeon. And no one has had more reason to appreciate the ghastly tragedies of oral sepsis, which his misplaced ingenuity so often carries in its train. Gold fillings, gold caps, gold bridges, gold crowns, fixed dentures, built in, on, and around diseased teeth, form a veritable mausoleum of gold over a mass of sepsis to which there is no parallel in the whole realm of medicine or surgery. The whole constitutes a perfect gold trap of sepsis of which the patient is proud and which no persuasion will induce him to part with. For has it not cost him much money, and has he not been proud to have his black roots elegantly covered with beaten gold, although no ingenuity in the world can incorporate the gold edge of the cap or crown with the underlying surfaces of the root beneath the edges of the gums? There is no rank of society free from the fatal effects of this surgical malpractice.

I speak from experience. The worst cases of anemia, gastritis, colitis of all kinds and degrees, of obscure fever of unknown origin, or purpura, or nervous disturbance of all kinds ranging from mental depression up to actual lesions of the cord, of chronic rheumatic affections, of kidney disease, are those which owe their origin to, or are greatly complicated by, the oral sepsis produced in private patients by these gold traps of sepsis. Time and again I have traced the very onset of the whole trouble of which they complained to a period within a month or two of their insertion. The sepsis hereby produced is particularly severe and hurtful in its effects, for it is dammed up in the bone and in the periosteum, and cannot be gotten rid of by any antiseptic measures which the patient or the doctor can carry out. Moreover, it is painless and its septic effects therefore go on steadily accumulating in intensity without drawing attention to their seat of origin.

Such are the fruits of this baneful so-called "conservative dentistry." The title would be a fitting one if the teeth were a series of ivory pegs planted in stone sockets. But the teeth being what they are, namely, highly developed pieces of bone tissue possessing, I would point out, a richer blood and nerve supply than any piece of tissue of the same size in the whole body, and planted in sockets of bone with the closest vascular relations to the bone and soft tissues of the periosteum and the gums, the title that would best describe the dentistry here referred to would be that of "septic dentistry." Conservative it is, but only in one sense. It conserves the sepsis which it produces by the gold work it places over and around the teeth, by the satisfaction which it gives the patient, by the pride which the dentist responsible for it feels in his "high-class American" work and by his inability or unwillingness to recognize the septic effects which it produces.

Such is Hunter's indictment of the medical and dental professions. The one has encouraged the "fixing" of the teeth; the other has done the work; while the patient has paid the bills and is proud of the finished production. Is Hunter right or wrong? Is all of the teaching of thorough mastication of the food wrong? Is the work of the dental profession so diligently built up by years of earnest, patient and careful toil all wrong? Are the teeth primarily responsible for all of the ills of the human flesh? Is extraction the only remedy? These are but a few of the questions which we must ask ourselves. And these are some of the questions that I propose to discuss with you.

In the course of my studies at college there was very properly given a course on physiology, and as the subject of digestion very properly came in for its share of discussion it was very carefully included. We were told of the various motions of the stomach, of its secretions, of intestinal digestion. Pepsin, rennin, hydrochloric acid, succus entericus, secretin, trypsinogen, amylopsin, steapsin, enterokinase, were thoroughly discussed. But of the teeth how much? Just enough to describe their anatomy and their function of chewing. Conversely, in the treatment of indigestion the first



requisite was to have the patient see a dentist, to have the teeth filled, supplied, put in order. And only an American dentist could do this. "You may cut your own fee," we were told, "but it is your duty to see that your patient's teeth are fixed." Not a word, however, here or in our lectures on pathology or medicine of the sepsis of the mouth, of its wonderful bacteria, of diseased roots of teeth, of abscesses, etc. This was of another field and was not our province.

I accept the indictment of the medical profession. The accusation is true. Primarily, the trouble is with them. The family physician has not been as careful as he should have been. The children have not been referred to a dentist as they should have been. Parents have not been instructed. The toothbrush has been a neglected instrument. It has even been considered the mark of "sissyism" to use one. The early teeth have become septic. They are lost. The permanent teeth have been damaged before they are erupted. And as a result, children have grown to maturity with teeth defective or diseased.

It is at this juncture that the parental folly is first recognized. The young man wishes to appear as genteelly as possible. In most cases it is too late. The harm has been done. The dentist is consulted. No one has taught him of the evils of sepsis. The dentist tries to restore the contour of the mouth. The patient is perfectly willing. He desires it. His friends have gold in their mouths. Why should he not have it? Talk, if you will, about the removal of a root. Not while there is a possibility of having a crown placed upon it, will he consent to its extraction. And so the indictment as charged against the dentist is primarily the fault of the family physician; secondly, of the patient; and, lastly, of the dentist. The first has advised it; the second has demanded it; and the third has merely complied.

#### ORAL SEPSIS AS THE CAUSE OF SYSTEMIC CONDITIONS AND VICE VERSA.

Against Hunter's theory, however, there is much to be said. If oral sepsis

can be a cause of systemic infection, cannot systemic infection as well be a cause of dental infection? If infection of the kidney can be brought there by the blood stream, cannot pus-producing bacteria be carried to root apices? No matter how the germ primarily gains access to the body, its primary place of implantation is not bound to be the teeth. There are other places of lodgment. What of the tonsils? What of the bronchi or lungs? Did one ever see a case of primary tubercular apical abscess? What has a tooth to do with frontal or ethmoidal sinusitis? And what of the other systems? If a Neisserian endocarditis can be of hematogenous origin or a perinephritic abscess be of a Neisserian nature, cannot the abscesses of the teeth be likewise the result of the circulation of the blood? "Does not deep dental infection occur when the oral hygiene as practiced by the patient is scrupulous?" asks Brown.<sup>4</sup> "Are not periodontal lesions at times surprisingly absent in mouths apparently dirty enough to harbor all varieties?"

But this does not relieve us from the responsibility of the proper care of the mouth. This does not relieve the physician from advising the use of the toothbrush. Nor does it relieve him from advising against the use of certain articles of diet likely to affect the teeth or hasten decay. Likewise it neither relieves him from advising periodic visits to the dentist nor, that greater factor, the parent in seeing that this advice is carried out. With this the physician's service is over. The duty now rests upon the dental profession. But it is a duty that will be accepted cheerfully. It will be thoughtfully administered.

And, lastly, of the patient himself. There is nothing that makes a professional man so disgusted as to have one deliberately thwart his best efforts. We fain would close our office. The beautiful sunshine, the fair heavens, the trees, the birds, the rod, the gun are far more inspiring than the type of patients one so often sees. And were it not for the fear of opprobrium or the loss of a fee so badly needed, how many of us would endure the taunts of such patients?



It has been well said by Hunter that the teeth are not a set of ivory pegs set into sockets of stone, but consist of highly specialized osseous tissue. How many of us so consider them? The teeth are of osseous tissue highly specialized. They are supplied by the blood and nerves as well as any other tissue. They are indeed one of the end results of the epiblast rather than of the mesoblast, but like the bones they will not stand for an indiscriminate amount of abuse. The greatest amount of asepsis and antisepsis must be used in all manipulations. They must be treated and handled in a thoroughly surgical manner. Now, how many of the older school of dentists carried out these procedures? How many have tried to render the gums and teeth aseptic? How many have tried to keep the field of operation aseptic? How many have boiled their instruments before and after each operation? How many have tried to sterilize their hands or dressings? How many in the olden days have zealously cleaned out the root canals? In other words, if in the surgery of the bones the asepsis has become so rigid as not to permit the handling of the bone by a finger without a sterile glove and the use of two knives is demanded (that opening the skin being promptly discarded), how can we hope for the best results upon other osseous tissue unless attention be paid to a good technique?

#### OBSERVATIONS BY THE AUTHOR.

My work as a roentgenologist has of necessity brought me into contact with much dental work of the present and former age. I have observed many fillings, much pyorrhea and many abscesses, and I am convinced that many of the bad results that I have observed could have been avoided. I have observed numerous amalgam fillings with no attention to the roots. I have observed bridges deliberately placed on septic abutments. I have seen many porcelain crowns upon septic roots. I have seen gold crowns innumerable. I have seen good teeth often sacrificed. And so.

I am convinced that much of this could have been avoided. I think all of you will agree that the old method of "killing" the pulp by arsenical paste is in most cases to be condemned, that the old scheme of filling roots with creasoted cotton is most undesirable and that malocclusion plays a rôle not inconsiderable in the etiology of pyorrhea.

It has been well said that the mouth is the dirtiest portion of the human body. In spite of all that we can do, few of us possess a wholesome breath. There are various eructations from the stomach; there are many exhalations from the lungs; and these are discharged into the air through the mouth or nares. In theory, only carbon dioxid should be exhaled, but in actual practice all of these products of a septic decomposition in the intestinal canal (and especially of a colon rich in saprophytic bacteria) are discharged by the upper passages. Nor is this all. Particles of food are retained in the interstices of the teeth and decay as in other places. Even the saliva throws its deposit upon the teeth and mucous membranes of the mouth. So that the tongue is generally examined in the course of a medical consultation. Of course there are tongues and tongues; the tongue of typhoid or other diseases, the "torpid liver" tongue, etc. So that, to quote an old professor, "often the best prescription for a foul breath is not an abundance of the essential oils but a dose of calomel."

It is quite reasonable that none of us desire to live in a house infected with sewer gas; it is quite essential that we surround ourselves with the greatest amount of fresh air; and it is equally essential that our digestive systems be kept clean. This then leads us to the question of swallowed septic material. What becomes of the discharge from old pyorrheal pockets or sinuses in the alveolar processes? Naturally it is swallowed. It mixes with the food in the stomach. It tends to conflict with the function of that organ. It is hurried into the intestinal canal. It mixes with the normal and the other intestinal flora and a most destructive result ensues.

The mephitic gases are, as we have said above, excreted by the lungs through the air passages. The products of the pyogenic bacteria are also absorbed. They circulate in the blood stream, to bear their impress upon the heart and in turn upon the parenchyma of the kidney.

To describe the many and varied bacteria of the mouth would be an almost unending task. Almost all of the germs of the infectious diseases, almost all of the pus-producing organisms and bacteria more or less harmless, exist side by side. If now there are any breaks in the surface of the teeth or fissures in the gums and teeth, or between the layers of the peridental membrane, we may expect trouble. Sooner or later we shall have a collection of infective material more or less defined. This in other words is an abscess. The bacteria multiply, their secretion is absorbed by the blood or swallowed, and it is in this way that foci primarily of the teeth (or rather of the apices of the teeth) give rise to systemic infection. It is from these observations that Hunter evolved his theory. It has become the working basis of certain internists who would blame all of our ills upon the teeth.

This is the theory of Metchnikoff. It is the question of phagocytosis. The faithful leukocyte gives up his life in defense of the system, but in doing so, the bacteria find a fertile soil and it is by the hematogenous distribution of the toxins that our bodies are infected. Of course, the system can stand a certain amount of sepsis. This varies in individuals. It is only when the toxin produced by the invading hosts is greater than the neutralizing substances produced in the body economy that we find ourselves on the losing side. It is a struggle for existence. Hence the first thing to be thought of is the radical removal of the sepsis. This is the plea of the school of exodontists. "If thine eye offend thee," says our Saviour,<sup>5</sup> "pluck it out, and cast it from thee; for it is profitable for thee that one of thy members should perish, and not that thy whole body should be cast into hell." Such indeed is the story of the tooth.

We must be prepared to have the offending member removed.

This is where the examiner must take into consideration every means of diagnosis at his command. He must carefully inspect the mouth. He must inspect the gums and teeth. He must note the amount of fillings, crowns and bridge work and be prepared frankly to deal with his patient and himself. But in the great majority of this work he must seek the aid of the roentgenologist. It is by this means alone that the greatest amount of knowledge can be gained. Time and again I have found abscesses at the apices of the best looking teeth. I always suspect large fillings, crowns and bridges. Often I am disappointed. I have found excellent teeth among the most mushy gums, and I have wondered why the teeth of some lady, who scrupulously observes every precaution regarding oral antisepsis and asepsis, should have to be removed; while some man, often an old smoker or chewer, with teeth worn down and mushy gums, should go uninfected; but such it is. We must be careful, we must observe well. Our patients have been educated. Many are willing to sacrifice a tooth or two, but they need to be well assured before submitting to an extraction. Gentlemen, may I say this to you: Learn all that you can about the roentgenology of the teeth. Learn to interpret the work yourselves, and unless you have sufficient time and patience for the most careful work, send your patients to an expert in whom you have the fullest confidence.

The results of the extraction of a few septic teeth are often most amazing. The journals and textbooks are so full of case reports that I do not intend to burden you, but such a case as the one referred to me by Dr. James H. Culpepper, that I am about to cite, cannot be overlooked: Mr. F., photographer, sixty-one, diabetic, finds himself unable to work, looks anemic and feels bad. In short, Mr. F. appears as an example of septic absorption. An examination of his teeth showed nine abscesses. Yet in spite of the diabetes, both Dr. Culpepper and I advised the extraction of



the infected teeth. By easy stages the operations were performed by Dr. Jackson. Mr. F. then took a vacation of a few weeks. He returned to Norfolk quite recovered, and resuming his occupation is quite as well as he ever was.

But let us not be too hasty in our conclusions. Mrs. T., about fifty, was referred to me some years ago by Dr. Charles R. Grandy with the request that I examine her stomach. I did so with a negative result. She then consulted a leading internist in Baltimore, who, after examining her mouth, diagnosed the case as pyorrhea. She returned to Norfolk to have the pyorrhea treated. The psychic effect was most marked. Her husband, meeting me on the street, told me he thought she was much improved. But this did not prevent her from becoming a patient in a sanitarium, a victim of pellagra and insanity.

#### OTHER FOCI OF INFECTION THAN THE TEETH.

And let us not again deceive ourselves. There are centers of infection other than about the roots of the teeth. I have observed the most remarkable improvement after the removal of a diseased appendix. The skin became clear, the patient fattened and in every way improved. The same can be said of the tonsils. Dr. P., about twenty-eight, suffered from severe rheumatism. His teeth were carefully examined with a negative result. He spent one or more seasons at Hot Springs, Ark. He improved. Returning home he was again subject to rheumatic seizures. His tonsils were removed. After another season at Hot Springs he returned to Norfolk. He has gained in weight and remains well.

To these we shall add another case. A young man consulted a leading authority in Baltimore. His gall bladder and appendix were removed with no improvement. His teeth were negative, but an old prostatitis made itself felt. With attention to this, his condition has improved. Let us, therefore, thoroughly understand that the teeth are not alone to blame; that there are other foci of infection.

It is the duty of the physician to examine his patient thoroughly. He should observe the entire body. If the case is one attributable in his opinion to the ingestion of septic material or to some localized condition of pus, he must find it. The days of indiscriminate drugging have gone. Why prescribe large quantities of the bromids for epileptics? Whatever the cause of the disease, its toxins must be eliminated. Hence the employment of fresh air, moderate exercise and strict supervision of the intake. Why prescribe the salicylates for rheumatic pain except for a temporary relief? This disease is now thought to be due to the absorption of septic material from some focus. Let us get rid of the pus. Throw physic to the dogs and look for infection. Let us examine all of the great systems of the human body and not eliminate any one until we are sure of its innocence.

#### PROTEST AGAINST RECKLESS EXTRACTION OF TEETH.

To the great school of exodontists there is naturally some opposition. Thus Alvarez<sup>6</sup> protests against what he terms the reckless extraction of teeth:

I believe that we have lost our heads over this thing and that the time has come to call a halt. Men have obtained such beautiful results in some cases by extracting teeth that some of them are now trying to explain most diseases on the basis of these focal infections. In practice, they pull the teeth first, and if the patient returns unbenefited, they can then look to see what is the matter with him. . . . I would emphasize the fact that I have seen my share of the miracles described by my radical friends. I, too, have seen inflamed joints go down overnight; so-called tuberculous glands disappear as suddenly; headaches leave for good, and so on; but these things have not blinded me to the fact that for one result I have seen many failures and disappointments. . . .

We must recognize these failures; we must face them squarely and study them with particular care. Many people are not benefited by the extraction of teeth no matter how thoroughly it is done, and no good can come from further refinements of that technique. In the Middle Ages if a man died it was because he had not been bled enough, or be-



cause it had not been done from the right vein. Today we know that bleeding is useful in only a few conditions. Similarly, the day will come when focal infections will not be dragged in to explain all ills of the flesh. Seeing that there are possibilities of failure, we must be more honest and conservative with those who put their lives in our hands. By all means let us continue to look for alveolar abscesses but, if we are to keep the respect and confidence of the public, if we are to avoid damage suits, we must be more careful what we promise some of our patients in return for a toothless mouth. Before deciding whether any or all of the suspicious teeth are to come out, the physician must look the patient over from head to foot. If he is young and sound, and if he has a dangerous arthritis or severe headache for which no other cause can be found, I believe we are justified in insisting on a thorough removal of the diseased tissues. When, however, the patient is old and failing; or when we find high blood pressure, arteriosclerosis and nephritis, let us be careful. Focal infections may perhaps contribute to the development of these chronic degenerative diseases, but I feel sure that they are not the only or even the principal causes. Certainly my experience has been that although the removal of the teeth will sometimes seem to give the patient a new lease of life, the arteries continue to harden, the pressure continues to rise, and sooner or later the symptoms return. Hence it is that in these cases we should carefully consider all the factors involved. If the infected teeth are not serviceable, if they are loosened, perhaps hanging to wobbly bridges, or if their crowns are gone, there need be no question as to their removal. But if they are strong and serviceable, if the areas of rarefaction are small and questionable, and particularly if restoration by bridges will be impossible, let us be frank with the patient. Let us tell him that the proposed extraction is more or less of an experiment; that we will not promise him anything; but if his troubles are annoying him so much that he wants to leave no stone unturned in his treatment, he can try it.

This protest by Alvarez cannot be ignored. We all agree that too many teeth have been sacrificed, but are we prepared deliberately to leave a focus of infection, however well fortified against by the natural defenses of the body, as a source of future trouble? Are we prepared to take the risk? And even if

it should be proved that the infecting agent to which the patient's malady is due be not that contained in the pus distinctly demonstrated at the apex of a certain tooth, should we not try to relieve the defensive forces of the body? We must study our patients. Some undoubtedly can get rid of a certain amount of sepsis. It has even been demonstrated that apical abscesses are perfectly consistent with the best health. There is such a thing as sterile pus. There is such a thing as the absorption occasionally of an abscess. But are we prepared to take the risk? The defenses can be broken down. "The hour when no man knoweth." Let us by all means treat our patients as we would ourselves be treated, as Alvarez so carefully concludes in his article. But let us go farther. Let us follow the advice of Polonius<sup>7</sup>:

To thine own self be true,  
And it must follow, as the night the day,  
Thou canst not then be false to any man.

#### CAN ABSCESSSES BE CURED?

Can abscesses be cured? This is a question that we must all answer. Is extraction the only remedy? This is the opinion of the exodontist. Pus must be eradicated. Abscesses must be drained. Hence we must consider the size and position of the abscess. Only a thorough roentgen examination can decide the question. But even then, as in other parts of the body, the roentgen findings must be interpreted in accordance with the history and clinical symptoms. Perhaps it is in the examination of the teeth, however, that the roentgenologist feels he can be most certain. But in my own opinion the clinical symptoms and the history, as we have just said, must be considered. Extraction is certainly the method of choice. But some of us feel that everything should be done to drain the abscess and if possible save the tooth. A wooden leg is far better than no leg, but it is certainly not so good as a leg of flesh and bone. So also with the teeth. A good natural one is certainly to be preferred to an artificial

one. But this is only provided that an aseptic result can be obtained. Can this be done? This is your problem. Thoma<sup>8</sup> suggests the operation of apiectomy. Theoretically it has much in its favor. The tooth can be nourished through the peridental membrane. The operation can only fail. And having made an honest, though unsuccessful, attempt to save the tooth, we are no worse off.

But returning to our subject of oral sepsis we must consider this: Even if it is definitely proved that the abscess on a certain tooth is the direct cause of the patient's ills, it must not be supposed that its removal will result in an immediate cure. We may remove the primary focus, but it will take the system some time to throw off the absorbed toxins. Hence the logic of elimination. Tonics, fresh air, plain food, exercise, massage, sweating, purgatives, etc., all of these have their uses, but in general the after-treatment must be purely for the purpose of putting the system in the best shape. The battle has been won; but it will often take many years to restore completely the devastated region to its former beauty or usefulness.

In the light of our present knowledge we can only say that, if a focus of infection be found in the mouth or on the apex of a tooth, we must recommend its elimination, but we cannot be sure that it will cure any ill, much less all of them. We shall at least, however, materially lessen the burden placed upon the system. We may have the most brilliant results. We may utterly fail. Even in case our conclusion is right and we have definitely shown that the malady in question is due to an offending tooth, we cannot be sure of an early recovery. The damage has

been done, but, at least, we can try to see that no further harm is done. This is my opinion of the rôle that the teeth play in systemic infection. We must sterilize the mouth. We must render it as clean as possible. And to this end we shall neglect no means at our disposal.

The field for earnest co-operation between the medical and dental professions is large and full of promise. The old system of indiscriminate drugging is past. It is the patient himself that we shall study. The modern physician will be less of a therapist but more of a pathologist. The surgeon will study the pathology of his cases and treat them as physiologically as possible. If the former ages of medicine, surgery or dentistry have been those of manual dexterity, the new era will be founded upon a deep and careful study of pathology. I would note that the Rockefeller Institute and your National Association are spending large sums in the field of research. It is as students of physiology and pathology that we shall know the truth. Having learned the truth, the truth shall make us free.

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# Histo-pathology of the Jaws and Apical Dental Tissues.

No. XI:

## Abscesses—Peridental and Metastatic Abscesses.

By EUGENE S. TALBOT, M.D., D.D.S., Chicago, Ill.

**P**ERIDENTAL abscesses are also called blind and cold abscesses.

Under the heading "Development of the Cementum," Article No. VI, we demonstrated the wonderful blood supply to the teeth and surrounding tissue in all directions. The alveolar process, owing to its endotransitory nature, is unusually endowed with a vascular supply as compared with ordinary bone. The fact that arteries ramify to all parts of the bone and virtually stop at the root of the tooth makes it an end-organ. The dental pulp is the best illustration of an end-organ in the human body.

Rosenow has shown that bacteria and toxins in and about the fluids of the mouth, as well as from abscesses and pyorrhea about the teeth, may not only be carried by the lymphatics to every tissue in the body but by the blood stream as well. So much has been written upon this subject in the past five years that the facts are familiar to every one. I shall, therefore, not enter into a discussion of the subject in a general way at this time, but will confine my researches to the jaws and teeth, since very little research has been done in this direction. As has been already shown, toxins and poisons entering the blood stream may be carried to any locality about the roots of the teeth, but more especially to the locality between the roots of the molar teeth, as well as into the dental pulp.

I was the first to demonstrate a peridental abscess with the microscope, and published the same in the *International*

*Dental Journal* for April 1896. In the *Dental Digest*, June 1903, I showed microscopic peridental abscesses in Bright's disease, in pyorrhea, mercurial and lead poisoning, in diabetic and scurvy patients. Metastatic abscesses in the dental pulp due to toxins and poisons carried in the blood stream through the apical foramen to the dental pulp was worked out by Dr. Vida Latham and myself, and papers were read in the Section on Stomatology of the American Medical Association, and published in their journal and later in the *Dental Digest*, December 1903, under the heading, "Constitutional Causes of Tooth Decay."

### PERIDENTAL ABSCESSSES.

My researches upon peridental and metastatic abscesses in and since 1896 have been quite extensive.\* The most remarkable thing to me is the fact that so many of these abscesses develop about the roots of the teeth and in the dental pulp without giving the slightest inconvenience or even knowledge of their existence to the patient. I have found as many as three abscesses in a dental pulp and four peridental abscesses around the root of a tooth. These abscesses are occasionally found in the peridental membrane between the root of the tooth and bone. This is not always the case, however; they are more often found

\* I mention these facts at this time because, although the work was very extensive and well illustrated, later writers seemed to have overlooked the work.



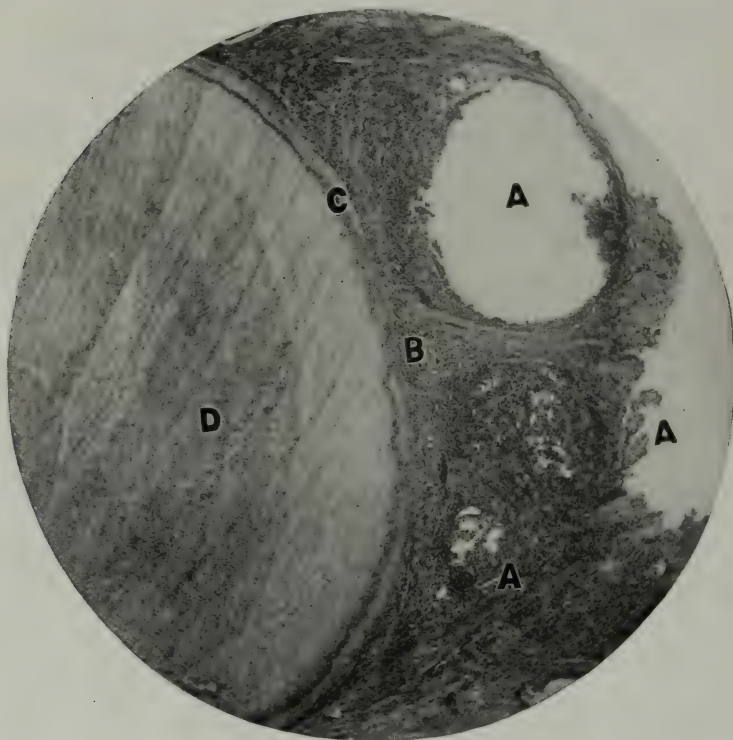
in the fibrous tissue outside of the peridental membrane, which was originally alveolar process in all localities, showing that the bone was first absorbed away.

Abscesses between the roots of the teeth are very common especially in people beyond middle life. Authors speak of them as being caused by the

teeth. The end-organ effect of the arteries is better displayed at this locality than at any other part of the tooth.

Naturally irritations and pus germs find a better resting-place for the production of abscesses at the bifurcations than at any other locality about the roots of the teeth.

FIG. 1.



(Magn. 45.)

drill passing through the floor of the pulp chamber and infecting the tissues. This theory can hardly account for the formation of so large a number of abscesses at these localities. Only a very small portion of abscesses located between the roots of the teeth can be attributed to this cause.

Under the heading of "Development of the Cementum," Article No. VI, I purposely inserted pictures showing the wonderful vascularity of the alveolar process between the roots of the molar

In the experiments upon dogs with the different drugs, in those cases in which infection occurred most abscesses were found between the roots of the teeth. Since it has been shown that poisons and infections are carried to a locality through the blood, abscesses which form between the roots of the molar teeth may be due to infections from the mouth as well as from the deeper tissues of the jaw.

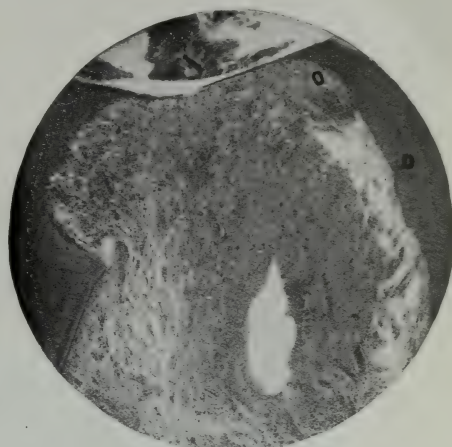
Peridental abscesses around the roots of the teeth have been demonstrated in

different pictures previously shown, due to infection from improper hygienic treatment of the teeth of dogs.

Figure 1 shows the root of a bicuspid tooth of a man sixty-four years of age: A indicates the abscesses outside of the peridental membrane, B the peridental membrane, C the cementum, and D the dentin. Three abscesses are seen in different stages of development. All three are outside the peridental membrane, which can be plainly seen between the root and the abscess wall, and are located in fibrous tissue which originally constituted the alveolar process. The

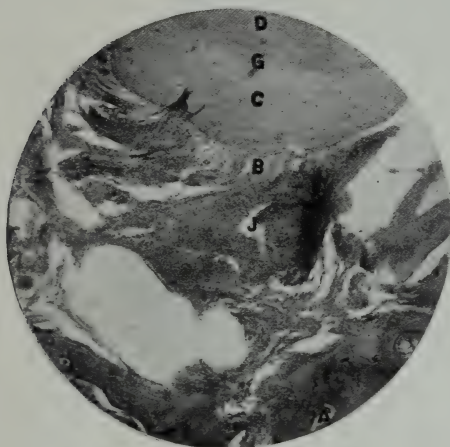
illustration of the susceptibility of the cementum to absorption upon the slightest irritation, which occurs before inflammation.

FIG. 3.



(Magn. 24.)

FIG. 2.



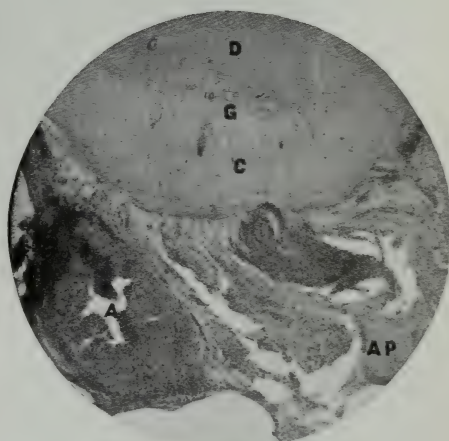
(Magn. 24.)

smallest one shows the fibers just forming into the sac wall. The next larger shows the sac wall nearly completed. The largest one has a well-defined sac wall. Peridental and metastatic abscesses about the roots of the teeth in advanced life, when constitutional diseases appear, occur very frequently. These abscesses evidently disappear as readily as they are formed.

Note that although these abscesses are close together, each is separate and distinct and each has a separate fibrous wall. Absorption of the cementum opposite the abscesses may be seen at three different places. The absorbed area has not reached the dentin. It is a splendid il-

lustration of the susceptibility of the cementum to absorption upon the slightest irritation, which occurs before inflammation.

FIG. 4.



(Magn. 30.)

lustration of the susceptibility of the cementum to absorption upon the slightest irritation, which occurs before inflammation.

Figure 3 is a low-power picture to



show the bifurcation of the roots of a molar in a dog. The root was filled in the usual way with a cone extending through the end of the root into the alveolar process. Bone absorption has extended throughout the entire surface between the roots. Infection occurred midway between the roots forming an abscess.

of a milder type than those which form alveolar abscesses; third, the tissue may be of a different type from the peridental membrane. We have seen that the fibers of the peridental membrane are finer and more compact than the fibers of the alveolar process.

Peridental abscesses do not discharge upon the surface like an alveolar ab-

FIG. 5.



(Magn. 60.)

Figure 4 is the end of a premolar root of a dog killed at the end of a week: AP is the alveolar process, c the cementum, D the dentin, and A a peridental abscess. Note that all these abscesses are outside of the peridental membrane, while alveolar abscesses are always close to the root of the tooth. None of these have sac walls. This may be due to any one of three causes. First, it may be due to the fact that they are young abscesses; second, it may be that the infection is

scuss, but discharge their contents direct into the lymph spaces and into the blood-vessels. While the quantity of pus is not so great as seen in an alveolar abscess yet they are more dangerous for the reason that the patient is not mindful of their existence. There is at the present time no method of diagnosis. Secondary diseases may follow in other parts of the body as a result. The physician knowing that there is an infection causing the trouble is unable to locate



the abscess. These abscesses therefore are very serious to the general health.

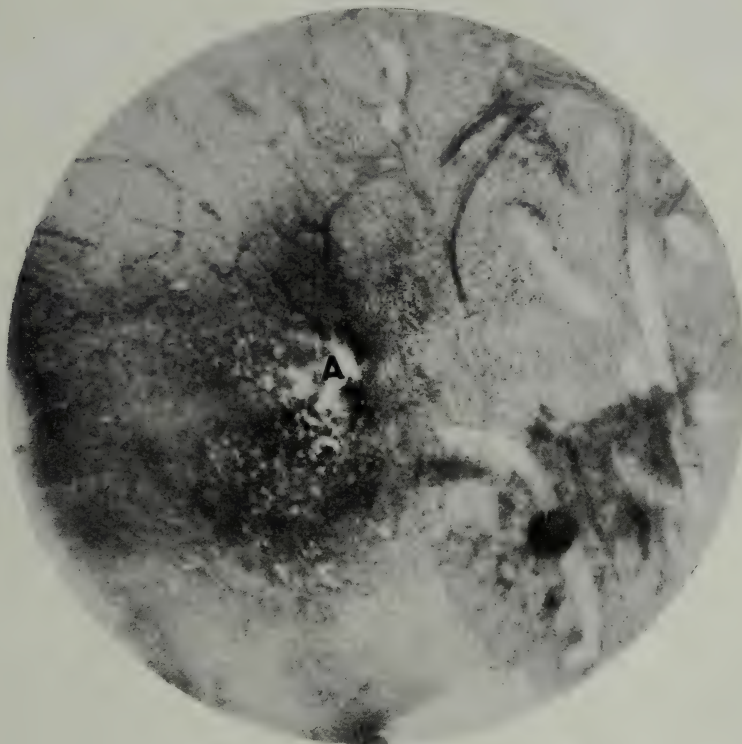
#### ABSCESSSES IN THE DENTAL PULP.

Figure 5 shows an area of the dental pulp in a molar tooth. Arteries are seen throughout the entire field branching in all directions. Fatty degeneration may also be seen throughout the

Figure 7 shows a fully developed abscess at A. This abscess is situated at the side of the pulp of a molar tooth. Arteries are seen around the outer surface of the picture.

Figure 330 in my work on "Developmental Pathology: A Study in Degenerative Evolution," shows active inflammation at A, a healed abscess at B, and a fully developed abscess at C, one above

FIG. 6.



(Magn. 60.)

picture. In the center of the field, at A, round-cell inflammation is seen to form about a growth of arteries due to metastatic infection.

Figure 6 is a picture showing an area of pulp tissue in a molar tooth. Arteries are seen extending and looping in all directions. In the center at A is also seen round-cell infiltration and the breaking down of tissue. The progress of this abscess is further advanced than the previous one.

the other and all upon the edge of the pulp. When an abscess forms in a pulp, it is possible that the nerve tissue is either destroyed or mummified so that pain is not experienced. The fact still remains that pulp abscesses due to migration of pus germs from without frequently exist but cause no pain in their development and that they also heal, as I have demonstrated.

In my paper on "Constitutional Causes of Tooth Decay," published in the De-

cember 1903 *Dental Digest*, I presented nine pulps from healthy teeth with abscesses therein. Since that work was published I have continually discovered abscesses in normal human teeth as well as in the teeth of healthy dogs. Miller,<sup>1</sup> Arkövy,<sup>2</sup> and Goadby<sup>3</sup> have all demonstrated pus germs in healthy pulps. These germs collect in the circulation from surrounding tissues and are carried

of diagnosis. We are apt in our present state of diagnostic evolution to regard all departures from the normal as due to germs (infections) and a majority of the profession cannot get away from this idea. All reports of X-ray examinations when a dark area is seen or a deviation occurs at the root of a tooth are to call it an "abscess," which is far from the truth.

FIG. 7.



(Magn. 60.)

by the blood stream through the apical foramen into the pulp tissue. While these germs are capable of producing pulpitis, they certainly do produce abscesses, as I have shown, and the pulp tissue has sufficient vitality to restore the pulp to health.

#### CONCLUSIONS.

Under the heading "Pathology" the greatest lesson to be considered is the art

The art of diagnosis of the pathology of the jaws and apical dental tissue is still in its infancy. Ziegler, says:<sup>4</sup> "The cause of inflammation may lie either in mechanical, thermal, electrical or chemical influences, as well as in the influence of parasites."

In the study of the pathology of the apical dental tissue, as we have seen, changes always take place in structure before infection or inflammation can occur.

We have demonstrated this in every picture under the heading "Pathology." The *first* thing to be considered is that every animal operated upon was in a normal healthy condition. All operations were performed under as aseptic conditions as possible. Most of the pathology (we must call it pathology because the changes which take place are abnormal) therefore was due to mechanical irritations. Mechanical irritation is the cause of most of our pathology. The mechanical irritation may be due to drilling through the root either at the apical end or at the side, the results are the same. Forcing foreign substances through such openings no matter whether they are instruments, gutta-percha, or other root-filling material, drugs, water, air, or gases from decomposing protoplasm—such irritations at once set up pathologic conditions.

Second, in those cases in which infection occurs, and this includes all infections and inflammations, the same process of pathology results as in the first, only it progresses to a further extent. When root absorption is present it takes place at the same time and is due to the same cause as bone absorption.

For a better diagnosis of apical pathology, therefore, we must divide the process into three distinct divisions or stages, *viz*:

*First*.—In those cases, and they are the majority, where from slight irritation osteoclasts develop along the bone margin and at the edge of the root producing absorption of both. The fibrous tissue or trabeculæ is still in position. Sometimes the bone and root absorption is slight, and again it is quite extensive. Sometimes the bone is entirely destroyed between the roots. In such cases both bone and root under favorable conditions may be restored. Inflammation, pus germs, and abscesses are not present.

*Second*.—The irritation is more severe and destruction of both bone and fibrous tissue occurs. Absorption of the root may or may not take place. Inflammation is present which destroys the trabeculæ. A cavity is present usually the size of the absorbed bone area. If the

fibrous tissue is not restored new bone and cementum cannot be reproduced. Pus germs may or may not be present. Abscesses are not present.

*Third*.—In this stage the irritation is more severe. Absorption of bone occurs. Absorption of root may or may not take place. Infection of the trabeculæ and inflammation take place and finally abscesses form.

These three stages always take place and in the same order whether it be an alveolar or peridental abscess as demonstrated in all these pictures.

At the present time X-ray pictures do not show these different stages of pathology.

I have discussed this subject with two or three intelligent X-ray men with a view to perfecting their methods of photography so that these three stages may be distinctly outlined in the picture. Without this knowledge the operator is all at sea in regard to procedure in treatment.

One of the X-ray men was quick to observe the classification and, instead of using the term "abscess" in every case, calls all three conditions "osteoclasia," meaning absorption of bone.

While osteoclasia represents the first stage and abscess the third, the operator is as much at sea with one as the other explanation, since in either case he must decide by the appearance of the picture to which stage of development the disease has progressed.

The method of taking X-ray pictures, therefore, must be so improved that the three different stages may be definitely shown in the pictures.

#### BIBLIOGRAPHY.

<sup>1</sup> MILLER, W. D., "Micro-organisms of the Mouth."

<sup>2</sup> ARKÖVY, J. *Centralblatt für Bakteriologie*, Orig., xxix, p. 745.

<sup>3</sup> GOADBY, K. W. "Mycology of the Mouth."

<sup>4</sup> "General Pathology," Tenth Edition, p. 314.

31 N. STATE ST.

(To be continued.)



## Business Methods in Dentistry.

By WILBER M. DAILEY, D.D.S., New York, N. Y.

(Read before the Ninth District Dental Society of New York.)

**T**HE subject tonight is the business side of dentistry, which I shall try to define briefly. Profession means rendering service; business means selling goods. This is getting down to the gist of the matter in a practical way. The professional man is not supposed to derive riches from his profession. The financial side of it is only incidental. In business the purchaser is the sole judge of the value of what he purchases and assumes all responsibility. In a profession, however, the professional man assumes all responsibility for the service he renders, and you as professional men are the sole judges of the value of your services and not the patient. You are held responsible by the State, which gives you the right to practice, and you should not receive any instructions from your patient. The value of professional service is dependent on the character, ability, and integrity of the man who renders the service, but a business transaction depends on the ability of the purchaser of the goods to judge the value of what he is buying.

The dentist is expected to have received the proper training to practice his profession and to use approved methods, to have modern dental equipment, and to exercise caution and judgment in practice. Therefore, as I said before, the professional man is the sole judge of his services and he must use his best judgment with regard to methods, and the patient must not be experimented upon by the use of untried methods. It is unfortunate that professional men have little or no business training. Training in business is essential to success in the professional world. This is

a scientific age and the science of dentistry cannot be dissociated from business. They go hand in hand. If the dental faculties understood business methods, they would prepare the embryo dentist for his future by conducting the infirmary practice in a business-like manner.

From reliable sources I have been informed that fifty per cent. of all dentists five years after graduation have given up practice. What is the reason? Are the teaching methods at fault, or is it lack of business training? Many men enter dentistry because they think it an easy way to make a living but fail because of lack of business training.

It is said that a large percentage of this fifty per cent. who fail are physically and mentally unqualified for practice. Simply because they have passed their examinations does not mean that they are qualified for the future. It simply means they were able to pass their examinations.

### LOCATION.

With regard to location, I believe that it makes little difference where a man locates, if he has an ideal and will carry it out in his practice. I am sure he will succeed, regardless of location; that is, provided, of course, he locates where it is possible for him to practice his profession. I believe he can do well and be a worthy member of society and, if his territory is large enough, will ultimately make a success.

### OFFICE EQUIPMENT.

The modern, up-to-date office should be everything that the term implies. It

should be equipped to the best interests of the patient and the dentist. It should be a stimulus to the owner and create in him a desire to elevate his calling to the very highest standard. A dentist who takes an interest in his work realizes that by having modern equipment it will minimize his effort in doing his work and will give him the opportunity of obtaining fees by which he can develop his scientific equipment and attainments, which is always necessary and is the prime object of the professional man.

I shall try to show you how to give your office distinctive features which will create in the minds of your patients a most favorable and lasting impression. The office represents the man. It reflects his personality and impresses the patient favorably or otherwise. First impressions are lasting. The reception room should be plain and simply furnished, no ornaments, and no family portraits on exhibition, as they only invite the accumulation of dust.

Books kept on the office table for the use of adults should be selected with great care so as not to give offense. Political, or religious matter is, in my opinion, unnecessary. For children, picture books of animals, flowers, birds, etc., are suitable. Have on your table current issues only of magazines. The old magazines can be given to the hospitals or Salvation Army. A toilet room, equipped with a mirror and toilet articles for women patients, is necessary.

#### FURNISHING AND EQUIPMENT OF THE OPERATING ROOM.

The operating room should not be too large and should be simply arranged. Linoleum floor covering is the best, with walls tiled or painted; chair any color, if only kept clean and well oiled.

The cabinet must be kept in an orderly manner so that the operator can supply his wants quickly. Thorough sterilization of all instruments is necessary; and, if possible, one should have enough duplicates to perform a day's work without returning the instruments

to the cabinet. The sterilizing can then be carefully and properly done by the nurse. A formaldehyd cabinet should be in every office, as it saves time for the nurse and eliminates confusion.

#### IMPORTANCE OF CLEANLINESS IN THE OFFICE.

Proper sterilization of instruments is necessary for the dentist's protection as well as that of the patient. All instruments should be sterilized before using for each patient. Cleanliness is the most important feature of dental practice. An unclean operating room is a menace and danger to the health of patient and dentist. Too much emphasis cannot be laid upon the matter of cleanliness. I recently read of three dentists who died from infection received in their offices. Of course the dentist is more liable than the patient to infection, and especially when the dentist does not get the proper amount of exercise and his vitality is low.

Head-rest covers should be changed at each sitting, as there is danger of transmitting scalp diseases.

Do not have any unnecessary or odor-producing drugs about the office. The odor in some of the large office buildings in New York, where dentists have their offices, is almost nauseating. Oil of cloves should never be purchased. Fresh air is essential in the office.

One should have for waste and soiled gauze napkins paper bags which can be burned, and have a special container for towels. This diminishes the possibility of infection.

Another help in practice is the use of cross-cut burs, sharp chisels and carborundum stones. By using cross-cut burs and chisels one can accomplish more than by using the smooth bur. If you will read your dental journals you will find the smooth-cut bur is used only for cutting dentin and not enamel.

#### KEEPING A RECORD OF PATIENTS.

On the occasion of a patient's first visit, have the dental nurse obtain the



name in full. If a married woman, secure the husband's business and home address; also telephone number. Before the next visit, if you give credit, be sure you look up the financial standing of the new patient or the person who is responsible for payment. At a cost of \$25 a year you can obtain the Retail Dealers' Guide Book, one of the best reference books to have in your office. Extra slips are furnished, giving you the privilege of a special investigation of the person's financial standing and promptness in paying bills. I have been using this Guide Book for fifteen years and I find it is well worth the price.

#### HANDLING PATIENTS.

With regard to the handling of patients, let us take the men first. As you know, men are difficult to handle and require the most care. Business men are good patients, but men whose vocation is in the open are by far the best patients. With hotel and restaurant men, butchers, men about town or heavy drinkers,—should you have even a simple operation for this class, be on your guard, for they usually have weak hearts, low vitality, and, as a class, are known as "bleeders" (hemophiliacs).

Women patients are of a nervous temperament and must be handled with tact and consideration. Always consider the age of your patient. It will act as a guide and be of great help and assistance in controlling your patient. Be sure your patient is seated in a comfortable position before beginning your operations. A comfortable chair is necessary. Dr. G. V. Black and Dr. L. D. Shepard have published excellent papers on this subject. We all know how a patient will slide forward in the chair, and we can overcome this easily by tipping the chair back.

Look over every patient's mouth and throat for mucous patches and infected areas on his or her first visit. This is very important but I think many dentists disregard it. A survey of the patient's mouth is essential even for a simple operation. Make an examination and chart

of the mouth noting anything unusual. It is a very wise plan to follow this course of procedure.

Beware of tubercular patients. Never stand in front of the patient or in a position in which you are likely to inhale the patient's exhaled breath, as there may be present bacilli or other kinds of bacteria. A sudden cough might cause the lodgment of bacteria in the operator's eye, nose, or mouth. With change of location bacteria take on a different form and passing from one person to another they also change in their characteristics. Now that many of our men are returning from the other side, you will be amazed to find that we will have a number of new diseases which we have not had before. We have had recently Spanish influenza, and the virulence of this disease has been appalling. The influenza has affected principally the strong, well and young, and the danger of infection should be guarded against more carefully. During the influenza epidemic some physicians and dentists wore masks, and I think this was very wise.

Children are the best patients if you know how to handle them. To successfully handle them requires the exercise of a wonderful amount of tact and judgment, but if we obtain their confidence they make the best patients and are a good advertisement.

Promptness in keeping appointments is appreciated by professional men. Confidence is established by promptness. Insist upon the patient being on time, and be on time yourself; otherwise, if you should charge for broken appointments and not keep your appointment, the patient wants to know why. See a certain number of patients each day. Then you can do a proper amount of work for each patient.

Do not mix business with pleasure. There is a time and place for everything. Therefore do not permit friendships to be formed that will not be to your interest. Do not talk to your patient too much. I think it is better to say as little as possible and get right down to business.



Then there is salesmanship in our profession just the same as for a man in business. A man who keeps his store clean, has neat clerks, and uses discretion, shows salesmanship on every hand. That asset can be utilized in the dentist's office by having the unusual features I spoke of, not the commonplace things—things that attract attention at once.

The dentist must also have confidence in himself in approaching a patient. Personal appearance and conduct count for much in making a good impression. Use well-chosen words to direct the patient's mind into the proper channel and be careful not to arouse antagonism. Antagonism is very easy to arouse in some patients.

#### THE QUESTION OF FEES.

A good business man gives value for money received, and it is necessary for a professional man to do the same thing, the difference being that he gives service. When patients have means you can render your best services. Charge the patient for services rendered by hour or by contract, but be sure you obtain the proper remuneration for your services. Dentists in densely populated districts and in small towns and villages have about the same conditions with which to contend—working for persons receiving small incomes. It is necessary to educate your patient to realize the fact that you are performing a surgical operation, and it should be treated as such. You thereby raise the standard of your profession and your patients will soon recognize it. Do not hesitate to charge a proper fee for a good operation. More men fail because of small charges than those who make a proportionately honest and just charge. Many deceive themselves, believing they are making money while they are only making wages.

Bills should be sent out at the end or the first day of the month. The bill, when sent every month, looks smaller than when it runs for a long time. Insist on prompt payment. Have a card index system for your operations. Never trust your memory. I have a card sys-

tem that goes back twenty years. I have this arranged alphabetically, and all the patients' charts are together during the time they are with me. In visiting dental offices I find a woful neglect in keeping card systems. The methods used are very poor. The matter of records is a very necessary feature. No matter how pleasant a patient may be today, tomorrow he may be your enemy. You are always liable to suit. Your card system is absolutely important to you as a means of protecting yourself in legal action.

#### BOOKKEEPING.

Your appointment book, your day book, and ledger should be kept in an intelligent manner and in a way that can be interpreted. It is all well and good to use private notations, but it is proper to keep your books in such a way that you know where you are at any time. All receipts should be deposited, cash receipts, and everything else. Do not forget to have your books audited by a certified or public accountant. It only costs \$25 to \$50, and is money well spent.

Standardize all operations and you will find it will be the means of increasing your income. I mean from the very beginning to the end of each operation, considering wear and tear, bodily fatigue, your assistant's time, etc. Operations in the laboratory should be recorded just the same as those in the office.

An office building for dentists only and carried on as a dentists' office building should be carried on, under the supervision of some man who would select the men for the offices and be sure their equipment was of a standard that only a reputable dentist should have, would also increase the respect of the community for the profession.

#### INSURANCE.

Liability insurance is a good investment. Dr. Gould informs me that in the city of New York ninety dentists carry liability insurance. Six suits against these men were started this year; two of these suits were dropped when

they found that the men were insured. In the Fifth and Sixth Districts, with a membership of 238, insurance is carried by twenty men; during the year only two more were insured. It is positive negligence for a man not to carry this class of insurance along with life, fire, and accident insurance. Dr. Gould, who is the custodian of the Liability Insurance of the State organization with the United States Fidelity and Guaranty Company of Baltimore, has informed me that the Company has designated Dr. Harvey as the local custodian of this blanket policy, for which they charge \$10 a year.

#### INVESTMENTS.

Do not depend upon your own judgment in financial matters. The bank is in business to help people place their money in proper channels where the principal is safe. Get advice from the expert who has made a life study of handling money in an honest manner. Life insurance is a good investment provided you get the advice of an expert. Do not take the word of anyone who calls and wants to sell you insurance, as they are looking for their profit. A young practitioner is prey for the vultures of finance. Do not buy so-called works of art. They are a waste of money. Buy Liberty Bonds and your money will be safe.

Long hours of labor do not mean a

fat pocketbook. Rest and recreation are necessary to success. Vacations are important even if they do cost money. When you get back home, your viewpoint will have improved. Too close attention to your practice will warp you mentally and physically and is very poor business.

Do not deceive yourself or your patient by saying, "Your enamel is soft," or that the little drop of pus will not do any harm. You know, or should know, that the cavity was not properly prepared, or the roots were treated in an unscientific manner, or the tartar was not removed. Do your work in a manner that will command the esteem of your patients and increase their respect. Take an account of yourself and find out where you can improve your methods. Do not be afraid to underestimate yourself, for then you will begin to see light.

To be successful, it is necessary to systematize your methods of practice. It is fit and wise to investigate methods used by other men. Be ready always to receive and adopt new ideas.

"The mistakes of physicians are buried in the ground; the mistakes of lawyers are dangled in the air; but the mistakes of dentists stare them in the face—a constant reminder of carelessness, unskilfulness, and disregard for the demands of scientific dentistry."

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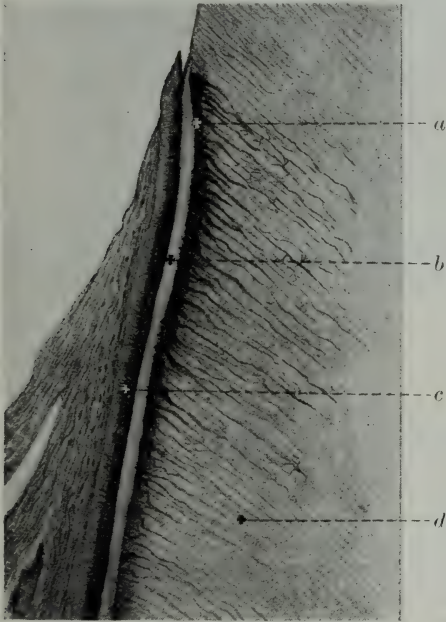
## Staining the Granular Layer.

By NEWTON G. THOMAS, M.A., D.D.S., College of Dentistry, University of Illinois, and WILLIAM G. SKILLEN, D.D.S., Northwestern University Dental School, Chicago, Ill.

THE granular layer of Tomes is a sheet of dentin surrounding the roots of all teeth close to the cementum but seldom extending occlusally coronal to the gingival line. The defi-

dition the writers have never observed; in all instances that have come under

FIG. 1.



Showing the abrupt beginning of the granular layer: *a*, Granular layer; *b*, clear layer; *c*, fibers in cementum; *d*, dentin.

nition, like all others, is not quite satisfactory but must be stated as it is, because no less an authority than Black reported the granular layer extending into the crown of the tooth.<sup>1</sup> This con-

FIG. 2.



Showing a few forms of spaces or tubule terminations in the layer.

their notice the layer stops abruptly at the gingival line.

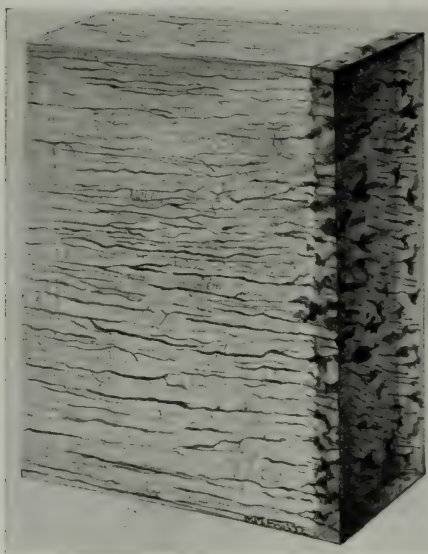
As the name implies, this strip of den-



tin shows in ground sections an irregular band of easily recognized granules which gives to it a sanded appearance. It usually begins weakly but increases varying in width as it proceeds apically, where it usually widens until it mingles with the cemental lacunæ, forming a chaos of structural elements at the apical extremity.

Since the time of Sir John Tomes, who first described the granular layer, very

FIG. 3.



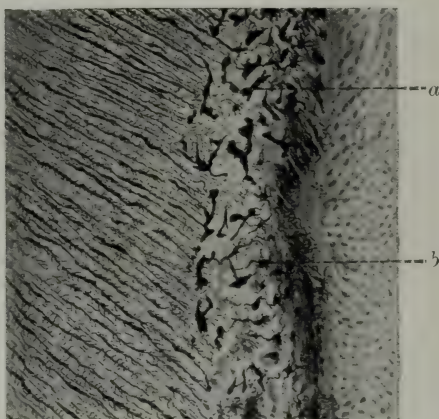
Schematic drawing representing the granular layer in three dimensions.

little has been added to the knowledge of its structure. It is agreed that the granularity is the result of irregular spaces external to which is a homogeneous layer of tissue. Nothing has ever been said about its function, but as a liability Black mentioned it as a factor in forwarding decay when the granules underlaid the enamel.<sup>2</sup> The histogenesis of the structure is practically untouched. Talbot suggests, but without sufficient clearness, that the layer is the product of epithelial debris.<sup>3</sup> Mentions that have been made of it have been only cursory

references to its presence. Charles S. Tomes, son of the great pioneer mentioned before, adds nothing descriptively to the work of his father but asserts that tubules "appear to terminate in them."<sup>4</sup> Bödeker says, "The spaces are filled with soft protoplasm which is in connection with the contents of the tubules on the one side and lacunæ on the other."<sup>5</sup>

In the various writings on the subject the nomenclature is not free from difficulties. Almost without fail the term "interglobular spaces" has been ap-

FIG. 4.



Showing tissue complex: *a*, Space of granular layer; *b*, cemental lacuna.

plied to these structures and to interglobular spaces proper. Salter describes the uncalcified clearly outlined spots in dentin which show so plainly as spaces in dried ground sections as being continuous with the spaces observed under the crusta petrosa. He explains further that the term "layer" applied to the subcemental structures is wrongly applied because "it is not continuous beneath the crusta petrosa, being interrupted, and consists only of the external abutments of the sheets of imperfectly calcified dentin."<sup>6</sup> Similarly write Burchard and Inglis concerning these two structures.<sup>7</sup>

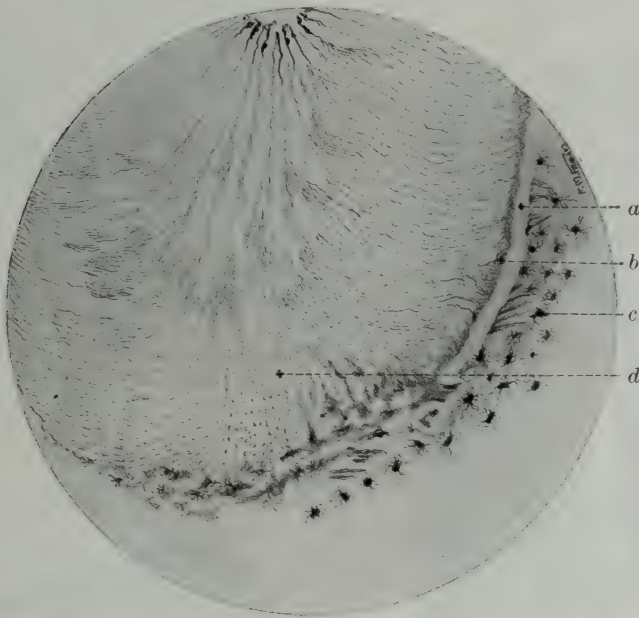
Hopewell-Smith calls attention to the difficulty of affecting the layer by stain-

ing. He says, "the structure is stained with utmost difficulty by the action of carmine or any of the other basic, acid or aniline dyes."<sup>8</sup> Noyes declares that "the granular layer is not seen in decalcified sections." To quote directly, he continues: "So far as the author is aware no one has called attention to this fact before. In decalcified sections stained with hematoxylin and eosin the position

flow in forming the first layer of dentin."<sup>10</sup> It is difficult to picture "minute, calcified, globular masses" without their seeming granular.

By the procedure outlined below the staining of the granular layer is readily accomplished. Not only do the unnumbered spaces of this layer show clearly but tubules are susceptible to the process as well as the embedded fibers

FIG. 5.



Showing a near approach to orderly formation: *a*, Structureless layer uninterrupted almost to apex; *b*, granular layer; *c*, cemental lacunæ; *d*, dentin.

of the granular layer is always occupied by a clear layer which takes the stain in an entirely different way from the rest of the matrix, and in which no indication of spaces can be seen."<sup>9</sup>

In spite of the heretofore unflinching mention of this structure as a constant element in dentin by all dental histologists, recently there appeared an interesting denial of its existence. "I propose," says the writer, "to try to show that there is no such layer in the tooth as the granular layer. It is a collection of minute, calcified, globular or mulberry-shaped masses that have failed to make a perfect

of the peridental membrane in the cementum and the lacunæ in bone (see Fig. 6, *c*). Tubules are traced unbrokenly in developing teeth beyond the thickness of normal cementum into the peridental membrane. Such tubules are not numerous but are in a proportion similar to the like occurrence in enamel.

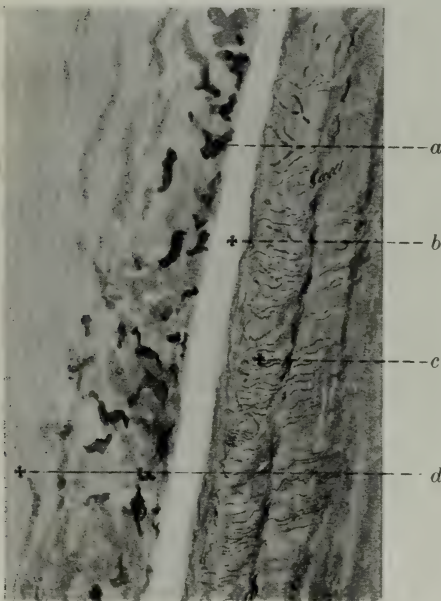
The granular layer shows all the physical characteristics mentioned before as seen in the ground sections. It is quite uniformly narrower at the gingival line and wider as it is traced apically. Likewise the spaces tend to increase in size toward the apex. In all the instances



examined the beginning of the layer is abrupt at the gingival line (see Fig. 1, *a*).

The most striking feature of the layer is the variation of the structures that form it. It is observed that the spaces vary in shape and relation in inconceivable variety, from the merest points to anastomosing canals seven to ten microns in diameter (see Figs. 2 and 3). More frequently the spaces are irregular lakes united by canaliculi (see Fig. 4).

FIG. 6.



Showing granules of the layer, the clear layer, and embedded fibers of the periodontal membrane in cementum: *a*, Granule; *b*, clear layer; *c*, embedded fibers; *d*, dentin.

Curiously different from the foregoing, fantastic loopings of the dentinal tubule ends contribute to the structural maze. Also around such loops occur branchings such as characterize the tubule in the more central dentin.

In teeth that have not been subjected to much disturbance during their formative periods the clear layer can be followed to the apex of the tooth (see Fig. 5), or the granular layer may be in

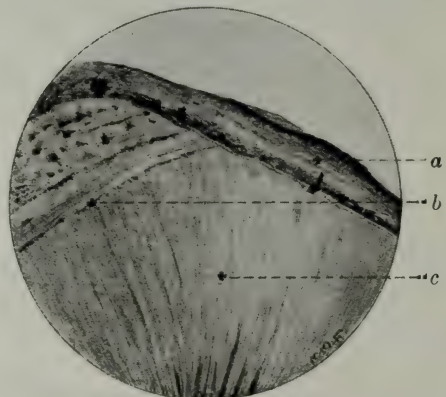
similar instances uniform. In apices that have been much disturbed during form-

FIG. 7.



Showing an orderly arrangement of the granular layer in the apical region: *a*, Clear layer; *b*, granular layer; *d*, dentin.

FIG. 8.



(From "Histology and Patho-histology of Teeth," Smith.) Showing absence of granular layer under secondary deposit of cementum: *a*, Secondary cementum; *b*, granular layer under primary cementum; *c*, dentin.

ation the granules fuse with the heavily lacunated cementum. Such is the con-



fusion of tissues in such areas that granules, tubules, and lacunæ form a meshwork of communication (see Fig. 4). It is readily seen that Bödeker was not far from right when he said tubules continued into the spaces, which in turn connected with the cement corpuscles.

One observation more needs emphasis. The great variation seen in the structure of teeth prevents the statement of any rule concerning it. This has been intimated in a previous paragraph. The character of the granules has no uniformity; they may be large multiform spaces, merest nodules at the termini of tubules, loopings of tubules or a mere tangle of tubule ends (see Fig. 2). The layer may be uniform around the radicular portion of the tooth with a slight increase in thickness in the apical area or grow thin or thick in any area. A confusion of elements, dentinal and cemental, while usually appearing at the apex may appear on the lateral surface, although such disturbances seem to be confined quite uniformly to the apical third of the root.

*Staining technique.* Bichromate of potassium, 2.5 grams; bichlorid of mer-

cury, 5 grams; water, 100 cc. Place material (fresh) in above 3–4 months (minimum). Place in 10 per cent. formalin either before or after decalcifying 24 hours. Decalcify in 10 per cent. nitric acid. Wash. Proceed as for ordinary preparations; cut sections in strong ammonia water; stain as desired.

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<sup>3</sup> TALBOT. DENTAL COSMOS, October 1919, Page 929.

<sup>4</sup> TOMES, CHARLES S. "A Manual of Dental Anatomy." Page 80.

<sup>5</sup> BÖDEKER. "Smith's Normal and Pathological Histology of the Teeth." Page 73.

<sup>6</sup> SALTER. "Dental Pathology and Surgery." 1873, Pages 77, 78.

<sup>7</sup> BURCHARD AND INGLIS. "Dental Pathology and Therapeutics." 1912, Page 238.

<sup>8</sup> HOPEWELL-SMITH. "Histology and Histopathology of the Teeth." 1903, Page 70.

<sup>9</sup> NOYES. "Dental Histology and Embryology." 1915, Page 148.

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## History of Diseases of the Teeth Which Cause Systemic Diseases and Vice Versa.

By H. L. AMBLER, M.S., D.D.S., M.D., Cleveland, Ohio.

THE "Papyrus of Ebers," 3700 B. C. mentions diseases of the teeth and gums, and gives a number of prescriptions for the treatment of dental diseases. Tso-ma-ya-khan (Chinese) is an illness common to children after smallpox; the gums turn black and are ulcerated; flow of blood from the gums accompanied with fetid breath, 1000 B. C.

The Talmud is the Jewish encyclopedia written 200 B. C. E. and 300 C. E., wherein occurs, Ber. 44b, the record that the Rabanan have learned: "The spleen is good for the teeth, but bad for the entrails; bran is bad for the teeth, but good for the entrails. Scurvy begins in the mouth and ends in the entrails."

Herodotus, 500 B. C., said medicine in Egypt was divided among those who treated the eye, head, belly, secret diseases and teeth.

Hippocrates, 460 B. C., described some of the diseases of the teeth and their treatment with medicines, operations and dentifrices. He was a great man for his time, and gave some attention to the influence of diseases of the teeth upon remote organs of the body.

Hippocrates recognized four fundamental qualities: cold, heat, dryness and moisture, and says health depends on the just relation of these principles as to composition, force and quantity; when one is wanting, there is a diseased condition, and if the humor collects in the interior of the body, not only the part that remains deprived of its presence will suffer, but also that into which the flow takes place and the engorgement is produced. He ascribed great importance

to the teeth and their diseases. At the time of dentition, children are subject to irritation of the gums, fevers, convulsions, and diarrhea; if the bowels are moved frequently they are less subject to convulsions; if they have a severe attack of fever, they rarely have convulsions; if they get drowsy but not thinner they are liable to have convulsions; if they have a cough, the period of dentition is prolonged. He cites a case where a phagedenic affection of the mouth caused suppuration of the ear; this is not a coincidence but a fact intimately connected with cessation of the toothache; he said Egesistratus had a suppuration near the eye. An abscess showed itself near the last tooth. The eye recovered. There was pus discharged from the nostrils; it looked as if another tooth would suppurate, but it did not, and suddenly the eye and jaw swelled up.

In making a diagnosis of a disease, he advises searching for its point of departure; did it begin with headache, earache, pain in side, etc.? In some cases the nature of the malady is revealed by the teeth. In fevers he considers it unfavorable if there is a deposit of viscous matter on the teeth. In cases of necrosis of a tooth the supervening of a strong fever with delirium gives reason to fear a fatal exit. Gingival hemorrhage with persistent diarrhea is an unfavorable symptom; easy and frequent bleeding of the gums may be a profound alteration of the blood which is a serious condition.

Colds in the head, with or without fever, produce pains in the teeth and eyes. In many who have enlargement of the spleen the gums become affected,

the mouth has a bad odor, and the gums may be detached from the teeth. Women who have white flux may have singing in the ears, dimming of sight, or setting of the teeth on edge; when there is an ulcer on the tongue, it may be caused by a sharp tooth or root.

Celsus, born 30 B. C., said that children are subject to ulcers of the mouth often due to dentition accompanied with convulsions, fever and diarrhea. Ulcers of the mouth (aphthæ) sometimes lead to death in children; if the ulcers are attacked by gangrene we must consider whether the whole body be unhealthy, and if it is, do something to strengthen it.

Plinius Secundus, born 23 A. D., said that sour or too abundant foods are digested with difficulty and also those which are ravenously swallowed; as a remedy vomiting has come into use, but it makes the body cold, and is most pernicious to the eyes and teeth.

Galen, 130 A. D., says "Before trying to cure toothache you must find out the cause, and among other remedies use vapour-baths. Doctors' shops are real pharmacies, where they have all kinds of remedies and instruments for all parts of the body, and they practice some dentistry."

Lavater regards physiognomical semeiotics founded on the nature and form of the body as of great importance to the medical practitioner, that he might be enabled to say to an individual in health, you may expect this or that disease sometime in your life; with this knowledge, he would be able to prescribe the necessary preventives against such diseases as he was most liable to contract.

In France, under Louis VIII (1223 A. D.), there were 2000 leper houses. Leprosy caused diseases of the teeth and they were very filthy if they had not fallen out.

Theophrastus, 1528, cited "Tartaric Diseases," because they burned like hell, and formed deposits of matter, as wine deposits tartar. The mildest form of the "Tartarus" is the so-called dental tartar; sometimes it forms gout-stones,

calculi of the bladder, kidneys, gall-bladder, lungs and intestines.

Ryff, 1544, says: "The eyes and teeth have a great affinity or are reciprocal to one another, by which they very easily communicate to each other their defects and diseases, so that the one cannot be perfectly healthy without the other being so too: violent pains in the teeth may cause syncope or epilepsy through injury communicated to the heart or brain."

In 1559 a book published in Germany, probably by Peter Jordan, says: "During the seventh month, when the teeth begin to grow they have pain and sickness and should receive frequent baths, and the gums must be rubbed with goose grease, and warm oil of camomile be rubbed on the neck and chin."

Fabry, 1560, showed the etiological relation frequently existing between prosopalgia or hemicrania and dental diseases, which was cured by extracting decayed teeth.

Arculanus, in the sixteenth century, said the teeth were set on edge by eating sour foods and fruits, which cause the rising of bitter or sour moisture and gas from the stomach which enters the mouth.

Fauchard, Paris, 1728, says:

It must be remembered that where a portion of our body is inclined to pain, the same may be traced to the teeth so long as they remain in their alveoli and are covered by their membrane, and that some diseases of the teeth are sympathetic and occur occasionally; diseases of the mouth sometimes destroy the maxillary bones; in difficult dentition employ bleeding and clysters to keep the bowels open; these reduce the fever and stop or prevent convulsions. In febrile diseases note the eyes, temples, nose, tongue, lips and different colors of the teeth, which indicate the extent of the illness; the teeth often cause otalgia, prosopalgia, and cephalalgia; a carious molar caused necrosis of the condyle of the jaw and temporal bone.

Runge, 1750, said that "pus in the antrum may make its way as far as the alveoli or orbital cavity, and *vice versa* alveolar suppuration can give rise to abscess of the antrum;" in this latter, we



may find polypi, cysts, sarcomas, cancers and exostosis. He also relates a case of a cuspid tooth with a cyst adhering to the root, that caused disease of the antrum. Ozena, he said, "always stands in relation to a suppurative affection of the maxillary sinus."

J. G. Pasch recorded a case of deafness which was cured by the eruption of a third molar tooth.

John Greenwood, New York, 1776, did not confine himself to dentistry, but entered upon the broader field of surgery and treatment of the maxillary sinus.

John Hunter, London, 1778, says: "Diseases of the teeth are apt to produce diseases in neighboring parts, frequently of very serious consequences, such as abscessed carious bones, etc.; all of the diseases of the teeth which are common to them with the other parts of the body, should be treated by the physician or surgeon."

Neither Hunter (English) nor Bichat (French) were practical dentists, but the mighty energy of their minds embraced the dental with the other branches of surgery, and the principles of physiology and pathology at large included this important branch, and revealed the connection and sympathies of the teeth with the entire framework of man.

Benjamin Rush, M.D. (1745-1813 U. S.), reports in 1801 that rheumatism in the hip-joint accompanied by severe toothache was cured by extracting a tooth; also a case of dyspepsia accompanied by severe aching of a tooth not decayed was cured by extracting the tooth; also a case of epilepsy was cured by extracting several decayed teeth. He says: "In 1802 Miss — had inflammation, pain and ulcers in the mouth at the usual time of catamenia, which at that time was always scanty, cured by extracting several decayed teeth, and she was relieved of the monthly disease in her mouth and afterward had a regular discharge of her catamenia." Dr. Rush quotes Dr. Darwin as saying that he cured headache and vertigo by having diseased teeth extracted, and Mr. Pettit, of France, as curing intermittent fevers,

vertigo and consumption, by extracting diseased teeth and supernumerary teeth.

Strickland, Baltimore, 1803, cured two cases of rheumatism by extracting diseased teeth.

Hayden, Baltimore, 1804, took up the study of medicine while practicing dentistry and the University of Maryland granted him an "M.D." He was a great anatomist, physiologist, etc., and took into consideration diseases of both body and teeth.

Randall, Boston, 1805, practiced dentistry and medicine at the same time. (No doubt he recognized and treated diseases of the teeth connected with other parts of the body. Ambler.)

Mills, Boston, 1814, said diseased teeth may cause the hollow cheek, putrid saliva, foul breath and days and nights of agony.

C. A. Harris, 1826, Greenfield, Ohio, practiced medicine and in Bloomfield, Ohio, he practiced both medicine and dentistry at the same time; he was a man of the broadest learning, and treated dental diseases and bodily diseases often in connection, knowing that diseases of the mouth have the widest possible range of sympathy.

In 1839 Chapin A. Harris translated from the French a work by C. F. Delabarre in which the latter says:

The physicians of our day better appreciate the importance of dentistry than those of a former age; they recommend it to our attention; they do not neglect to examine the habitual healthy state of the mouth, and hence they frequently make inductions which are useful to them in cases of disease. Notwithstanding the excellence of modern treatises on semeiology, there are a number of important symptoms connected with the jaws, saliva, tartar, etc., which have not been mentioned.

Professor Schill, 1840, says:

The gum is pale in chlorosis and anemia, purple-red before an active hemorrhoidal discharge, and in cases of dysmenorrhea, dark-red, spongy, and bleeding readily in scurvy and diabetes mellitus and after the use of mercury. Diminution of the saliva is peculiar to the beginning of acute diseases, and also to hectic fevers occasioned by affections of

the abdominal organs; viscid saliva occurs in smallpox, typhus and hectic fevers; in gastric diseases, where the liver participates, it becomes green or yellow; frothy saliva is seen in apoplexy, epilepsy, hydrophobia, and hysterical paroxysms.

During childhood or adolescence, when the formative powers are active and the nervous system highly acute, the sympathy between the gums and other parts of the organism, particularly the stomach, are, perhaps, greater than at any other period of life; severe constitutional disease is often followed by increased irritability of the gums, so that slight local irritation gives rise to an afflux of blood to and stasis of this fluid in their capillaries. In the sanguino-nervous temperament, dyspepsia and chronic hepatitis are not unfrequent and are indicated by increased irritability, and sometimes by a pale yellowish color of the gums. In scrofulous dispositions, the gums have a pale bluish appearance.

C. A. Harris, about 1845, said: "Atrophy of the teeth is caused by a diseased action in the cells of the enamel membrane, induced by some form of constitutional derangement, such as febrile or cutaneous diseases. Necrosis of the teeth may be produced by protracted fevers or the immoderate use of mercury." He said "Mr. Fox had a case of exostosis of the roots of the teeth where the palpebra of one eye had been closed for two months and the saliva was so copious that it flowed from the mouth when opened; the case was only cured by extracting all of the teeth."

"A Popular Treatise on the Diseases of the Teeth," by Robert Arthur, D.D.S., 1846, Chapter X, "Effects of a Disordered Condition of the Teeth and Gums upon the General Health," says:

The cause of earache may be traced to a diseased tooth, after applications of every description have been vainly applied to relieve the painful organ; diseases of the teeth may sympathetically, but seriously, affect very remote parts of the system, and the teeth may suffer in consequence of a reciprocal influence extending from a distant local disorder. A great many of the fatal diseases of infants may be traced back to the effects of difficult teething; inflamed gums, increased flow of saliva, redness of the cheeks, rash, twitchings of the lips and muscles generally, fever, constipation, and diarrhea, difficult breathing,

cough, painful inspiration, and, indeed, symptoms of pneumonia are sometimes present; the pupils of the eyes are permanently dilated, and finally convulsions and death, unless relief is obtained. Injurious effects on the stomach are produced by imperfectly masticated food; the fluids of the mouth; decayed and loose teeth; dead roots; inflamed and ulcerated gums; alveolar processes, dead or with their lining membranes in a state of continued suppuration; large quantities of tartar on the teeth. The mucous membrane which lines the mouth is continuous in the stomach and throughout the whole digestive tract. It is believed that the unhealthy exhalations from diseased teeth and gums so vitiate the air which is breathed as to produce injurious effects upon the lungs. Dr. Rush quotes a case from a French writer, in which consumption was cured by extracting diseased teeth. During attacks of fever, the teeth are very liable to decay.

When mercury produces salivation, the teeth are tender to the touch, the gums inflamed and swollen, and the breath offensive; sockets of the teeth are destroyed, gums ulcerated and slough away, and the teeth become loose and drop out. Adhesions of the cheeks to the jaw and distortions of the mouth sometimes follow.

C. A. Harris, 1848, said:

Teething may cause fever, drowsiness, diarrhea and cutaneous eruptions on different parts of the body, or pustules filled with fluid, but afterwards become purulent, or the eruption may be about the mouth, cheeks, and forehead, and scalp which dries up and is covered with scabs; or the patient may cough, have spasms of the muscles about the mouth, with emaciation, convulsions and death. An unhealthy condition of the permanent teeth often gives rise to constitutional disease, and the state of the general health at the time of the ossification of the teeth may exert morbid impressions on them. A disordered stomach or continued nervous irritation of the general system will produce toothache.

A bad habit of the body, such as the scorbutic, scrofulous, venereal or mercurial, is capable of affecting the maxillary sinus, because they weaken the vital energies of the system."

He quotes Boyer, before 1840, as saying that "inflammation of the antrum may be caused by a blow on the cheek, measles, or smallpox, but the most ordinary cause is pain or caries in the



teeth; all morbid conditions of the teeth and gums are the most frequent causes."

Harris says, further:

Salivary calculus may cause anorexia and derangement of the whole digestive apparatus: foul breath, catarrh, cough, diarrhea, pain in the ear, headache, melancholy. In long-continued diseases of the gums the general health is affected, the susceptibility of these parts is increased, but when restored to health the general health improves. The secretions of the mouth, especially the mucous, are often rendered, by certain condition of the general system, so acrid as to be a source of great irritation to the gums; bilious and inflammatory fevers, excessive use of mercury, venereal poison, struma, intemperance and debauchery may cause diseases of the gums. The long-continued presence of large collections of tartar (salivary calculus) alters the fluids of the mouth and produces pernicious constitutional effects. Anorexia, languor, general depression of spirits, headache, diarrhea, and rapid decay of the teeth are common to persons habitually subject to great viscosity of the buccal fluids. The lips become dry in all fevers and in spasmodic paroxysms. A mucous white coating is a sign of irritation of the intestinal canal, gastric intermittent fever, mucous fever, and before the gouty paroxysm; a brown coating is a sign of typhus, putrid fever, and acute exanthems. During dentition the seeds of many chronic diseases germinate, which otherwise might have remained dormant.

S. Sexton, M.D., New York, 1883, says: "Diseased teeth cause palsy torticollis, chorea, catarrh, eye and ear troubles."

In 1890, Willoughby Dayton Miller, D.D.S., published his investigations of the human mouth as a focus of infection, by which he scientifically established two fundamental facts: First, that the human mouth is the habitat and breeding-ground of a large group of micro-organisms, a great proportion of which are pathogenic; and second, that organisms originating in the oral cavity may be carried to other parts of the body and thus set up disease in organs and tissues remote from the oral cavity, and that septicemia may result from the absorption of toxins produced by bacteria in the mouth.

Garretson, "Oral Surgery," 1895, says:

The rheumatic diathesis is to be recognized as at least a predisposing cause of alveolo-dental abscess. As this toxic influence is recognized as having affinity with periosteal tissue, so there is no doubt that occasionally it is the resistive agent in the cure of such conditions. A similar view will also be found to hold good of the malarial poison, and indeed it may very well be, of all the other toxic expressions. Gout is another constitutional predisposition to chronicity in alveolo-dental abscess, just as it is a frequent excitant to pulpitis. Any acute disease tending to impair the general health may be followed by, or have associated with it, ulceration or gangrene of the gums. Measles is the most common condition.

R. R. Andrews, Boston, 1897, says: "The connection between bacterial growths in the oral cavity and a severe disturbance of the general health is today well known. Pulmonary diseases are brought about by the inspiration of germs from the oral cavity. The mouth is a breeding-place for infection of the digestive apparatus."

John S. Marshall, M.D., formerly a Chicago dentist, was the first president, 1901, of the examining board of the army dental corps, and for years he noted the action of diseased teeth upon other parts of the body.

Hunter, London, 1910, presented the same problem from the standpoint of his clinical studies, and drew attention to the havoc that was being wrought to human health and efficiency by diseased teeth. Military records, 1919, of all nations furnish convincing proof of the direct relation between sound teeth and the physical efficiency of the fighting men.

Taussig, 1919, has cured severe cases of vertigo by extracting diseased teeth.

Rupert Blue, Surgeon-General, United States, says: "Dirty, suppurating, snaggle-toothed mouths are responsible for many cases of heart disease, rheumatism, and other chronic affections."

Hartzell, 1919, says: Heart disease is a greater menace than tuberculosis, and heart disease to a large extent is preventable by proper mouth sanitation. Streptococcus viridans from the mouth enters the circulation through pyorrhea



pockets, dental abscesses and tonsil crypts, and may cause arthritis, nephritis, neuritis, gastric ulcer, chorea, septic purpura and iritis."

Barker, at Johns Hopkins Hospital, has shown that many cases of pernicious anemia have been cured by having infected teeth extracted.

Henry A. Cotton, M.D., August 1919, reports that at the State Hospital in Trenton, N. J., many patients suffering from mental diseases also had chronic infections of the teeth, tonsils, gastrointestinal tract, and after extraction of the teeth the patients recovered.

Charles H. Mayo, 1919, Rochester, Minn., states that three-fourths of the Mayo clinic is abdominal surgery, nearly all of which can be traced to mouth infection.

Billings, 1919, says: "The focus of infection which causes streptococcus viridans bacteriemia and chronic malignant endocarditis is often alveolar abscess."

R. C. Cooley, D.D.S., 1919, says: "Patient had rheumatic pains which continued for two years, until the wrist, shoulder and elbow were immovable; the only tooth left was an abscessed lower cuspid which was extracted; culture made from the pus which showed streptococcus viridans, from which a vaccine was evolved; this was injected ten times and resulted in a cure."

Mrs. Scharlieb, M.D., M.S., C.B.E., in an article on "Care of the Teeth and Gums" says: "Infection of the glands in the neck is caused by tubercle bacilli and decayed teeth; these bacilli are found among others that infect carious teeth and sore gums and find their way into lymphatic glands under the jaw and in the neck." (*British Dental Journal*, October 1, 1919.)

Deaver, 1919, says: "Chronic inflammation of the lining of the gall sac is produced by the invasion of the lining mucous membrane by bacteria carried thither in the blood from some smoldering depot of infection, such as diseased tonsils or infected teeth; crude dentistry is among the most prolific factors of gall-sac diseases."

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## Dental Relief for French War Victims.

By JOHN W. DORLAND, D.D.S., Pasadena, Calif.

WE have read considerable during the last months regarding the dental work that was done for the soldiers and sailors at home and abroad. This account deals with the dental relief given to the refugees of France—the women and children, and the old men and women, those who were driven from their homes, and were returning to nothing but ruins.

The writer went to France in February 1919 with the American Friends' Service Committee working under the Bureau of the Department of Civil Affairs of the American Red Cross. As this was after the signing of the armistice, greater freedom was experienced in getting

around and seeing the true conditions of this devastated land.

English Friends were engaged in relief work in France as early as 1914; American Friends from the entry of America into the war, though money had been contributed for this purpose before this.

In December 1918 French authorities allotted different sections of the devastated area to the various relief organizations. The Friends were given the region lying between Clermont-en-Argonne and Verdun, a district comprising thirty-nine villages, several of them so badly mutilated by shell fire that not one house remained with walls and roof undamaged.

At Grange-le-Comte, near Clermont, the first dental office in this region was established. A compact dental outfit

At this time an American dentist who had been stationed first at Sermaize, then at the Bettancourt Hospital, was

FIG. 1.



Refugees. New home built on ruins of the old. Cellar entrance where they lived.

had been shipped by S. S. White Co. to Paris, the writer taking with him some of his own instruments and foot engine. For the work on the field a light folding wooden chair made by Ash & Sons, London, was found to be the most convenient, while the portable S. S. W. chair was used in the office at Grange.

A room that had contained stores of seeds was cleaned out, and my outfit installed here temporarily, until the medical barracks could be completed. As Grange was the headquarters for the Friends in this area, considerable dental work was found necessary for the staff. The work consisted of cement, amalgam and enamel fillings, treatments, cleanings, and extractions. When plate work or gold work, which included crowning, was found necessary, the patient went to our American dentists in Paris, where all conveniences for this kind of work could be secured.

On the completion of the medical building, the dental office was transferred to its new quarters. Dental and medical offices at each end of the building with the office of the sanitary inspector between.

transferred to Grange, because the work was becoming increasingly heavy, needing two dentists to handle it. We now planned our schedule so that a dentist

FIG. 2.



Dental clinic in partially ruined house at Fromereville.

should be at headquarters all the time, and one going out to the villages to do work for the refugees.

The writer attended to the out-patient work during the first three days of the

week, and remained at Grange the latter part, my associate, *vice versa*. In this way the burdens were equally shared.

crippled so they could not practice again. We found towns of 10,000 or more without a single dentist and much larger

FIG. 3.



Dental and medical building.

In the work for the refugees we did not confine our efforts to the Meuse alone, but also went to the Marne and the Ardennes.

FIG. 4.



Dental car.

#### LACK OF NATIVE FRENCH DENTISTS.

We must remember that many towns where French dentists were located before the war were bereft of this service afterwards. Many French dentists lost their lives in the war. Many were financially unable to relocate. Others were

towns with only one or two dentists. The rural French were obliged to go often many miles to secure dental attention, on foot, bicycle or wagon, rail connections usually being very poor. It can be easily seen that this journey would not be taken unless the individual were suffering with a very bad toothache. The awful condition of the mouths we saw would surely make some of our oral hygiene specialists shudder, but we did not blame the people so much as the conditions of the country which made the sad facts possible.

The Red Cross issued a valuable pamphlet in French on the care of the teeth which had considerable circulation. Doubtless as a readjustment comes, these conditions will improve, and with it the better care of the teeth.

We found the best results were obtained when dental clinics were established at *équipes* where we had our workers stationed. It might be a center for agriculture, building, relief, or a co-operative store. We usually found a vacant room somewhere in one of the



mission huts, or in a house not entirely demolished, for the dental outfit.

Our plan was to notify the chief of the *équipe* when we expected to be at that place, then he would tell the mayor (even villages in France have mayors), who would post a notice to that effect. Sometimes the local town crier would go up and down the street ringing his bell, announcing the coming of *le dentiste Américain*. At relief centers a district nurse was usually stationed who gave us invaluable aid. When this was not possible, the driver of the car assisted at the chair.

Just a word for the faithful little Ford roadster that carried us over some of the worst roads in France: The body was an English type, right-hand drive, demountable wheels. A special compartment had been built at the rear, into which fitted the light wooden folding chair, the leather case for instruments, and the portable dental engine which was packed away neatly into a wooden case like a suitcase. Extra cans of oil and gasoline could also be carried behind.

Unfortunately, the word *arracher* (extract) was more frequently used in our work for the refugee than *pomber* (fill).

As we frequently could not visit a place more than once a month, teeth often had to be extracted that under ordinary conditions could have been saved. We obtained very good anesthetic results by the use of Locosthetic, which contained only 0.75 per cent. cocaine hydrochlorid and 1:50,000 of adrenalin chlorid. Eight to twenty minims was the amount usually injected. Some days thirty and forty teeth were extracted, and not once were any ill effects noted from the use of this preparation.

It can be readily seen then that with a waiting list often of thirty people or more, only the most urgent cases could be attended to, the patient being dismissed after emergency treatment, and told to return when we visited that place again. No plate, crown or gold work was attempted. Extractions, treatments, cleanings, fillings (enamel, alloy, cement

and gutta-percha) were the order of the day.

To encourage oral cleanliness we sold toothbrushes and paste at cost, two francs for a brush and a tube of paste. The brushes were of French manufacture, the paste Euthymol.

In the *Survey* of July 5, 1919, an article written by me appeared telling something of dental relief work in France. I will quote from this, showing another side of our work—Shall I say a very human side?

#### INCIDENTS OF PRACTICE.

The daily routine is not unmixed with amusing incidents. One day at the little town of Les Senades after a hard day's work, when the equipment was packed in the car and we were ready to start back to Grange-le-Comte, a man appeared who insisted that I *arrache* a tooth for him. I tried to tell him that my forceps were packed away and that it was impossible. He kept insisting, however. Finally we went back into the house, and our relief worker unearthed a pair of surgical pliers with which I extracted the offending member, much to the enthusiasm of the Frenchman.

After filling a tooth for a woman at Barle-Duc one day, she endeavored to embrace me as an indication of her gratitude; failing in that, she grasped me by both hands, and danced a sort of Indian war dance around me, much to the amusement of all present. It was at the same town that we were asked the loan of our car to take to the station an old lady, who had lost her wooden leg during the hasty evacuation of her village before the German advance.

Just recently at the shell-torn village of Brabant a rather frightful-looking old lady marched into the room, and as quickly tried to march out again. She had never seen a dentist in a white gown, or a dental chair. After some persuasion she sat down, and in a twinkling the tooth was out and in the bucket.

When about to leave, she said she wanted the tooth for a souvenir, and on being told it was in the waste bucket, plunged her hand well in above the wrist, and felt around until she got the tooth, wiped her hand on her skirt, and walked out highly delighted. This illustration is given to show the general indifference of the rural French for the unclean.

All classes of people were treated by

the writer, from the humblest peasant to a countess at Pargny near Reims.

Pasted on the wall of the room where the physician or dentist worked was the following legend in French:

All attentions given to the sick by the Anglo-American Mission of Friends are free. Gifts for the work offered by patients who have means are accepted with thanks.

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## Report of Committee on Dental Science and Literature.

By L. PIERCE ANTHONY, D.D.S., Philadelphia, Pa.

(Presented before the Pennsylvania State Dental Society, at its annual meeting, Reading, Pa., April 27, 1920.)

**A**GAIN it becomes my pleasure and privilege to present to the society a brief review of dental literature for the past year.

The condition of unrest and disturbed equilibrium so evident in the political, industrial and we may say spiritual worlds since the recent war came to a close has been definitely reflected in the dental world, and as a result dentistry today is being weighed in the balance by the medical profession and the public. Many of the methods of practice of the past are being questioned and some are being condemned. Dentistry is apparently on the threshold of the most serious crisis of its career as a profession. The seeds of our educational propaganda have borne fruit an hundredfold and the harvest is now upon us in the shape of increased responsibility upon dentistry which we fear the profession is not fully prepared to assume.

The medical profession, the dental profession, the public, and I might add our own mouths, are full of focal infection, and the responsibility for such a condition is placed squarely upon the dentist. In an endeavor to meet the demand to eliminate oral sepsis, a large portion of the dental profession, urged on by the medical profession, are resorting to wholesale extraction of teeth, which is nothing more nor less than a

tacit acknowledgment of our inability to meet the conditions and is at best merely temporizing with the situation.

For my part I am not ready to admit that dentistry has failed in the object for which it was created, namely, the saving of the masticatory apparatus. I am not ready to concede that all systemic diseases from dementia præcox to housemaid's knee arise from focal infections in the mouth, nor am I ready to admit the implied connotation of tooth extraction, namely, that dentistry cannot save teeth.

The reason why so many failures follow attempts to fill root canals and save teeth is one of faulty individual technique as the result of the lack of a definitely recognized standardized system of procedure. An attempt is being made by the profession to arrive at such a system and the progress is being recorded in the periodical literature.

That dentistry is awake to the seriousness of the situation and is anxious to solve its problems is evidenced by the readiness with which dentists enroll for all sorts and kinds of postgraduate courses. This anxiety to improve its methods of practice is greatly to the credit of dentistry, but my humble opinion is that if dentists, who are lamentably poor readers, followed the current periodical literature more closely, there would



not be the great demand that there is at present for the itinerant dental teacher.

#### ORAL FOCAL INFECTIONS AND THE FILLING OF ROOT CANALS.

The methods of dealing with oral focal infections and the treatment and filling of root canals are at present the most vital questions before the profession and are receiving more attention in the dental magazines than any other subjects.

Those who have written on this subject may be classified under two general groups, the radicals and the conservatives. By radicals we mean those who have taken the position that, because of the many dangerous conditions which may arise from focal infection and the great susceptibility of pulpless teeth to infection, all pulpless teeth should be removed from the mouth.

It is somewhat reassuring, though, to note that some of our prominent workers in this field who some years ago were among the radicals have after several years' experience and observation modified their views on this subject.

Rosenow,<sup>26</sup> Mayo,<sup>18</sup> Feldman,<sup>9</sup> Nodine,<sup>22</sup> Schuhmann,<sup>28</sup> Grove,<sup>13</sup> Blum,<sup>4</sup> Graham,<sup>11</sup> Lucas,<sup>17</sup> Brooks,<sup>5</sup> Hartzell,<sup>14</sup> Henrici,<sup>155</sup> Black,<sup>3</sup> Cotton<sup>7</sup> and others have made important contributions on the relationship of oral focal infection to systemic conditions.

Cotton's article reports his experience in the New Jersey Asylum for the Insane in which he claims to have relieved and cured many mental diseases by removal of infected teeth. We feel, however, that he, with many other medical men, is entirely too prone to attribute the cause of almost all systemic conditions to the teeth and has been unwittingly led into the advocacy of indiscriminate extraction.

Several articles have been contributed by both medical and dental men who are more conservative in their views than those just mentioned; conspicuous among these are Stengel,<sup>29</sup> Howe,<sup>16</sup> Alvarez,<sup>1</sup> de Schweinitz,<sup>30</sup> Mills,<sup>19</sup> and Johnson.<sup>16</sup> The very able paper by Dr.

Stengel<sup>29</sup> is an oasis in the focal infection desert and is, we hope, indicative of the return of the medical profession to rationalism in regard to this subject.

Mills' paper is a strenuous protest against indiscriminate extraction as advocated by many physicians. He pays particular attention to Cotton's views and attributes the present panicky condition of the medical and dental professions largely to what he calls the pernicious article published in one of the popular magazines claiming that Roosevelt's death was due to an abscessed tooth.

The treatment and filling of septic root canals, the most prolific source of focal infections, has been much written upon and we believe we are making rapid progress toward the solution of this problem. Valuable methods of root-canal treatment and sterilization have been presented by Prinz,<sup>25</sup> Crane,<sup>8</sup> Gethro,<sup>10</sup> Cameron,<sup>6</sup> Sendke,<sup>27</sup> Sturridge<sup>24</sup> and Best.<sup>2</sup> Talbot<sup>163</sup> and Pond<sup>160</sup> have contributed valuable papers on histology and bacteriology as related to root-canal fillings.

It is interesting to note that Pond's experiments lead us definitely to the conclusion that there are only three medicaments which can be relied upon to produce sterilization in a root canal, namely, formalin, iodine and dichloramin-T. McLean<sup>21</sup> presents an interesting paper dealing with the effect that our present conception of focal infection has had in radically changing many of our methods of procedure. If the number of articles on a subject is indicative of progress toward a solution, the focal infection problem will be shortly solved. We believe the solution will be found in aseptic surgical procedure combined with perfected individual operative technique.

#### CROWN AND BRIDGE WORK.

Next in importance and necessarily closely allied to the focal infection problem is the question of crown and bridge work. Crown and bridge work demands as a prerequisite to success a proper foundation in the abutments upon which



bridge work is placed, and in the nature of the case this means that in many cases devitalized teeth must be used. The controversy at present with regard to the relative merits and demerits of fixed and removable bridge work is almost the direct result of the hesitancy on the part of many operators to devitalize teeth and hence the increasing number of advocates of fixed bridge work.

The editor of the *Dental Items of Interest* is so strong in his conviction that fixed bridge work has no place in dentistry that he has undertaken a campaign with the avowed object of eliminating from dental practice fixed bridge work in favor of removable bridge work. In the system that he advocates, it is not always necessary to devitalize tooth pulps in order to utilize the teeth as abutments, but the mere fact that such devitalization is necessary in many instances emboldens us to prophesy that his campaign against fixed bridge work will not make any appreciable headway until the root-canal problem has been solved more satisfactorily.

Ward,<sup>49</sup> Mauk,<sup>37</sup> Goslee,<sup>34</sup> Ottolengui,<sup>42</sup> Strickler,<sup>46</sup> Morganthaler,<sup>39</sup> Beach,<sup>31</sup> Nesbitt,<sup>41</sup> Tinker,<sup>47</sup> Hovestad,<sup>36</sup> Frahm,<sup>33</sup> Moffitt,<sup>38</sup> Roth,<sup>45</sup> Roach,<sup>43</sup> etc., have presented valuable contributions to this subject.

The predominant tendency in most of the papers is toward the use of clasps, inlays, etc., in an effort to avoid pulp devitalization and the consequent chain of evils. Dr. Ward's paper we consider the most able defense of the crown and bridge system offered since Hunter's anathematization of crown and bridge work as practiced in America.

In the field of porcelain work so much neglected of late years, the porcelain crown seems again about to come into its own. There is an increasing number of operators deriving the benefits and satisfaction to be gained by the use of the porcelain jacket crown, one of the most conspicuous being the fact that a tooth can be crowned without the necessity of pulp devitalization. Articles on the technique and use of such crowns have

been presented by Vehe,<sup>48</sup> McCollum,<sup>40</sup> Buell<sup>32</sup> and Hovestad.<sup>35</sup>

#### RADIOGRAPHY.

To the application of radiography to dentistry may be attributed the main source of confirmation of the belief of such men as Hunter, Mayo, Rosenow and others that oral sepsis was and is rife in the mouths of our patients, and there is no doubt but that it has been the means of revolutionizing several phases of the practice of dentistry. We venture the assertion that no man can practice safe and sane dentistry today without the aid of the X-ray.

There is the growing tendency, however, to place too much dependence upon the X-ray examination without due regard to the clinical aspects of the conditions under consideration. We again urge the importance of the use of the X-ray in dentistry, but only as an aid in diagnosis.

Raper,<sup>57</sup> Blum,<sup>50</sup> Kells,<sup>54</sup> Miner,<sup>56</sup> Garretson,<sup>52</sup> Mead,<sup>55</sup> Simpson,<sup>58</sup> Darling,<sup>51</sup> McCoy<sup>56a</sup> and Hessler<sup>53</sup> have presented most excellent articles on radiography as an aid to diagnosis of oral conditions and also methods of using the X-ray.

#### PYORRHEA.

Pyorrhea has received its usual share of attention and some new developments have been brought out in its treatment. Periodontia as a specialty is being practiced by a large group of men who are specializing in the study and treatment of pyorrhea.

Stillman,<sup>70</sup> Robinson,<sup>68</sup> Hoffman,<sup>64</sup> Stern,<sup>69</sup> McDonough,<sup>67</sup> Henneberger,<sup>62</sup> Hoff,<sup>63</sup> Black,<sup>59</sup> Merritt,<sup>65</sup> McCall,<sup>66</sup> Crenshaw<sup>61</sup> and Clement<sup>60</sup> have dealt ably with the different aspects of this subject. The trend of treatment of pyorrhea is tending more and more toward prophylaxis rather than vaccine treatment and the use of various drugs, such as the once so popular emetin treatment, these latter treatments apparently being *passé* among the pyorrhea specialists or periodontists.

The number of those who place their

dependence in surgical technique as of old is increasing and we notice that among these Riggs' methods of dealing with this intractable disease have been rediscovered.

#### ORAL HYGIENE.

The practice of dentistry is inevitably tending toward prevention and in the nature of the case must necessarily do so if the profession is to be of greatest benefit to humanity. The dental hygienist is receiving much attention both favorable and unfavorable, principally the latter in Pennsylvania. Strenuous efforts are being made in Pennsylvania to stem the tide of professional approval of the dental hygienist, but we are of the opinion that, if these efforts result in the dental profession failing to approve and legalize the hygienist as a public health measure, the medical profession and the health authorities of the State will force the matter to a conclusion. Indeed there are at present indications that the matter will be dealt with by the public health authorities and without the co-operation of the dental profession which we believe extremely regrettable, as any effort in this direction to be productive of the most good should be under the direction of the dental profession.

Oral hygiene is a public health measure and as such has been recognized officially in England and will be in the United States before many years. As an economic measure oral hygiene has been thoroughly tried and proved of inestimable value in all walks of life.

Merritt,<sup>82</sup> Fones,<sup>75, 76</sup> Leak,<sup>81</sup> Barrett,<sup>72</sup> Howe,<sup>79</sup> Gearhart,<sup>77</sup> Gies,<sup>78</sup> Ferris,<sup>74</sup> Hyatt,<sup>80</sup> Bunting<sup>73</sup> and others have contributed notably to the propaganda of oral cleanliness.

Dr. Fones' articles deal with the benefits to the municipality of Bridgeport which have come from the care of the school children's teeth by trained dental hygienists and is a convincing argument in favor of the dental hygienist as a public health measure.

#### OPERATIVE DENTISTRY.

As has been the case for several years past very little has been written on what

may be strictly considered operative dentistry. With the advent of the inlay and the standardization of cavity preparation by G. V. Black, operative dentistry seemed to fall into a condition of innocuous desuetude. Some spasmodic efforts have been made to arouse an interest in the gold foil filling, which at one time was the most important part of operative dentistry, but with little success. These it would seem are definitely accepted as the best methods of procedure, but there is still considerable discussion of the merits and demerits of the much-maligned amalgam filling.

Furfey,<sup>88</sup> Ferrier,<sup>86</sup> Atkinson,<sup>83</sup> Gray,<sup>89</sup> Friesell,<sup>87</sup> Harper,<sup>91</sup> Lubeck,<sup>92</sup> Harder,<sup>90</sup> Millberry,<sup>93</sup> Pyper,<sup>95</sup> McConnell,<sup>94</sup> Blackwell,<sup>84</sup> Conzett,<sup>85</sup> and Souder<sup>96</sup> have presented articles dealing with gold foil fillings, cavity preparation, alloy fillings, etc.

#### PROSTHETIC DENTISTRY.

The renaissance of prosthetic dentistry seems to have arrived and a number of instructive articles have been presented dealing with various phases of artificial denture construction.

Efforts are being made in various parts of the country and by various men, and we believe with marked success, to place artificial denture construction upon a scientific and esthetic basis.

The efforts of Williams, Hall, Greene, Essig and Supplee are the most notable in this field and have tended greatly to improve the method of impression taking and tooth form as well as the mechanical phase represented by the articulator.

Bremner,<sup>97</sup> Gillis,<sup>102</sup> Tench,<sup>106</sup> Supplee,<sup>105</sup> Giffen,<sup>101</sup> Campbell,<sup>98</sup> Ulsaver,<sup>107</sup> Heermans,<sup>104</sup> Cross,<sup>99</sup> Frahm,<sup>100</sup> and Hall,<sup>103</sup> have done much to draw the attention of the profession back to the importance of this, for a long time, much-neglected phase of dentistry.

#### ORAL SURGERY AND ANESTHESIA.

These subjects have received the lion's share of attention in our literature for the past decade and the past year has proved to be no exception.

The world war brought the oral surgeon to the front almost precipitously



and we believe when the medical history of that conflict is finally written it will show that the oral surgeon dealt with his problems as ingenuously, as effectually, and with as large a proportion of success as any branch of the healing art. It now remains for the surgical procedures and principles developed and perfected during the war to be most profitably applied to civil practice, and McCauley,<sup>121</sup> Pont,<sup>124</sup> Levy,<sup>117</sup> McGee,<sup>122</sup> Grieves,<sup>114</sup> Gillies,<sup>113</sup> Tainter,<sup>127</sup> Dameron,<sup>111</sup> Ogden,<sup>123</sup> Kazanjian,<sup>116</sup> Lyons,<sup>119</sup> Lucas,<sup>118</sup> Roberts,<sup>126</sup> Brown,<sup>108</sup> Ivy,<sup>115</sup> Eby,<sup>115</sup> Moorehead and Dewey,<sup>120</sup> Blair and others are doing much to consummate that desirable end. The world war seems also responsible for a flood of Vincent's gingivitis as well as an abundance of literature on the subject.

Cook,<sup>110</sup> Puterbaugh,<sup>125</sup> Thoma,<sup>128</sup> Smith, Henahan, Kells, Burmeister,<sup>109</sup> Doubleday,<sup>112</sup> have made important contributions to the subject of the now so popular practice of conduction anesthesia (still we regret to note erroneously called by many conductive anesthesia). One author comments on the fact that nothing new has been presented in this important field since the introduction of the method by Fischer, but regardless of that fact the method is doubtless growing in favor. We note, however, that many of the exodontists who were and are enthusiastic in their claims for conduction anesthesia still supplement their work very materially by the use of the old reliable nitrous oxid in combination with oxygen.

#### ORTHODONTIA.

In the field of orthodontia more and more attention is being devoted to the study of their problems from the biological standpoint rather than from the standpoint of mechanics which occupied so much of the attention of orthodontists for the past decade.

The question of education of the dentist for this specialty is one that is occupying considerable attention at this time. It is an important question to the profession as a whole because of the bearing which the manner in which it is

settled for this specialty will have on that of the future preparation for other specialties of dentistry which are rapidly developing and which will demand consideration by the dental educators and the profession as a whole.

Canning,<sup>130</sup> Dewey,<sup>131</sup> Rogers,<sup>136</sup> Wenker,<sup>138</sup> Johnson,<sup>133</sup> Abell,<sup>129</sup> Flint,<sup>129</sup> Young,<sup>129</sup> Mershon,<sup>134</sup> Strang,<sup>137</sup> Hellman,<sup>132</sup> McKay,<sup>135</sup> and McCoy have contributed articles to the subject which will enable those interested to keep fully abreast of the developments in this important special field of dentistry.

#### BUSINESS METHODS IN DENTISTRY.

For those wishing to modernize the business aspect of their practices there are many valuable suggestions in articles by Barnes,<sup>139</sup> Byrnes,<sup>141</sup> Bosworth,<sup>140</sup> Wheeler,<sup>143</sup> and Rosenbaum.<sup>142</sup>

#### EDUCATIONAL AND HISTORICAL.

To those particularly interested in keeping in touch with the literature of dentistry through an intelligent and comprehensive interpretation of the tendencies in dental practice as reflected in the periodical literature we would commend for careful reading the article by Dr. R. W. Bunting<sup>146</sup> who presents a report on this subject to the Michigan Dental Society.

We have again followed the plan of classifying the bibliography under definite headings in the hope of aiding those who are particularly interested in a special phase of practice.

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211 SOUTH 12TH ST.

## Industrial Dentistry.

By LOUIS P. CARDWELL, D.D.S., Chicago, Ill.

DENTIST TO ARMOUR AND COMPANY.

"INDUSTRIAL dentistry" is a comparatively new effort to improve efficiency in the world of labor, which is fast proving its great value to both employer and employee.

It is not a charitable proposition forced on the employee by a paternal employer. On the contrary it is a business proposition of immense value equally to the man who furnishes the money for the payroll and the man who supplies the labor for the product.

The Armour plant requires its dentist to devote all his time to the employees, take care of all emergencies, stop all toothache, extract all teeth necessary, have X-ray pictures taken for diagnosis, examine and advise in every case and, last but not least, thoroughly clean teeth and put the mouth in a clean, healthy condition.

Further, the dentist explains in detail all that pertains to a case in language clearly understood by the patient so that when he presents himself to his own dentist for fillings, crowns, bridges or plates, he is thoroughly informed on the requirements of his case and as to what it is going to cost him.

The patient presents a clean, healthy

mouth for his own dentist to work in, and the dentist, realizing that his patient appreciates the necessity and value of the work to be done, approaches his task in a much more sympathetic frame of mind than is the case where he has to do all the explaining himself and at the same time operate in the mouth of a patient with a mouthful of bad teeth that are painful, diseased and very often foul with heavy deposits of tartar.

During the past two years, more than four thousand individual cases have been cared for by the dental department. Every patient has been told the particular requirements for his or her case, the best method of correcting the conditions and how to take care of the teeth in the future.

This explanation does not consist of a lot of set phrases. In each case attention is given the particular trouble and the appropriate instructions given and repeated again and again.

Through the columns of plant newspapers from time to time, we have articles pertaining to dental troubles and endeavor in a general way to inform the readers upon dental subjects.

444 W. DIVISION ST.

## Another Case of Focal Infection.

By ARTHUR L. ROSEBERG, Cincinnati, Ohio,

SENIOR, OHIO COLLEGE OF DENTAL SURGERY.

AFTER serving two years in the army I was returning from New York to Cincinnati to resume my college course, and it so happened that a lady of about thirty years of age and wearing dark glasses with one eye encased in gauze occupied the Pullman seat opposite me. It was quite natural that we should find occasion for conversation, and I soon found that the lady was quite talented and interesting. She had been finishing her musical education at New York City and related to me the troubles she had encountered which forced her to give up her course. She was then on her way to her home in Kentucky to perhaps spend the rest of her days in total blindness.

It was during the winter of 1918 and spring of 1919 that she first had an attack of several severe head colds, all the bones of the face and head aching, and the loss of the senses of smell and taste. After the last cold in May, when her head was bent forward, a stream of clear water exuded from the left nostril. She immediately visited a nose and throat specialist in New York City during the month of June and was informed that she had "rose fever."

About the first of July, while on her way from Glen Ridge to New York, she thought a cinder was blown into the left eye. At the same time there appeared a big black speck before the eye which soon spread out into a comet shape. The cinder annoyed her greatly, yet could not be located. The eye gradually filled with black specks, which looked like drops of water under a microscope. She again went to see one of the leading eye and nose specialists of New

York City, who made two thorough examinations of the eye, the second dilating the pupil, but he could find nothing wrong. He could not see the specks and informed the patient that they would probably disappear.

Three weeks later (August 22d) a black cloud suddenly obscured the sight of the left eye, completely blinding it. The patient at this time again visited the first specialist, who made an examination of the eyes, the ears, the heart and the lungs, trying to discover the cause of her trouble but found none. A blood test was then made, and an X-ray picture of the head taken, the result showing an infection of the sinuses. Here she was again sent to another nose and throat specialist in New York City. After his examination he informed her that the sinuses were the seat of all the trouble, and tried to wash out the antrum through the nose. This forced the infection farther in, making it a good deal worse. Here again she was directed to another nose specialist and he treated the sinuses by establishing drainage and using adrenalin and argyrol. This treatment was followed for a couple of weeks with a slight improvement in her vision (1/200). She was now sent to the Mountain Side Hospital, Montclair, N. J., for rest and further treatment. She learned at this time that the retina of the eye was unharmed and she decided to return to her home in Kentucky.

Of course, after listening to her story and noting that all the examinations were made without consideration of the teeth, and knowing that focal infections of the upper teeth, especially of the bi-



cuspid or teeth in the region of the antrum, could be the cause of troubles of the eye, I advised her upon reaching home to at once visit her dentist and have him X-ray all the teeth. I later heard from her and she informed me that the X-ray pictures showed two teeth abscessed, one in the lower jaw, a right lateral incisor with a granuloma at the apex, the other an upper second bicuspid with pus discharging into the antrum, and with a considerable portion of one of the roots necrosed. Upon physical examination these teeth appeared to be quite healthy. A few of the teeth con-

tained fillings, but the teeth in question had never been treated.

The teeth were extracted, the sockets curetted, and an opening made into the antrum for drainage. The ethmoid, sphenoid, frontal and maxillary sinuses on the left side were all infected and about a teacupful or more of pus was removed during treatment. The treatment was carried on through the nose and the opening made in the upper bicuspid region for ten weeks, the tonsils and adenoids being later removed. The patient has fully recovered and is enjoying today a vision of twenty-twenty (20/20).

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## Honest Dentistry.

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By M. A. FINK, D.D.S., New York, N. Y.

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WHILE the current professional literature records new inventions, new discoveries, as the result of the efforts of modern research workers, and while discussions and articles about root-canal filling, local, conduction and general anesthesia, apicoectomy, tooth replantation, removable and stationary bridge work, pyorrhea alveolaris, and a multitude of allied subjects fill the pages of the professional magazines, I think it is not amiss to draw at intervals the attention of dentists back to the aim and goal of dentistry. The situation is comparable to that of a person who in examining minutely the details of a splendidly executed monument of Gothic architecture might easily overlook the relation which the detail bears to the whole; so also the dentist who is constantly hearing and reading about all the various topics of his profession may easily fail to keep in mind what really constitutes the ultimate aim and goal of the whole science of dentistry. Another reason for restating this aim from time to time is that new discoveries may

have modified, elaborated, or altogether changed our conception of the science.

In my judgment, then, the aim of the science of dentistry is to prevent the necessity for those operations which the dentist is usually called upon to perform, or in other words the prevention of decay and the preservation of the teeth in a healthy and normal condition.

What would bring us nearest to this ideal state? I think I can affirm without the risk of much controversy that in order to attain our object it is imperative:

1. That we maintain the patient's teeth in a perfectly clean and polished condition.
2. That we examine the patient's teeth at frequent intervals.

It is a fact proved by an over-abundant amount of clinical evidence, that the chances for clean teeth to decay are fully ninety per cent. less than are those for unclean teeth. As a matter of fact Professor Miller by his classical researches has demonstrated conclusively that decay

of teeth is only produced by the action of the zymogenic and saprophytic micro-organisms on nutritive material. The accumulation of nutritive material for bacteria in the mouth indicates an unclean condition which unfortunately exists among millions of people of all classes and of all nations.

If the chances for teeth to decay are eliminated or at least enormously reduced by keeping them in a clean condition, then it follows as the day follows the night, that the best thing a dentist can do is to clean the teeth of his patients and keep them clean and polished. That would be his most glorious achievement. Every dentist will also readily admit that the best artificial restorations whatever they may be—fillings, crowns, inlays, bridges of all kinds, etc.—are far less efficient than the normal natural organs. Is that not another reason why the preservation of the natural organs is of the utmost importance? If we lose a valuable object, the loss however great is never so serious if the lost object can be replaced entirely and exactly. Lost tooth structure can never be so replaced.

If what I have stated is accepted as true, then naturally two questions arise in our minds:

1. Are dentists generally doing prophylactic operations?
2. If not—Why not?

Before endeavoring to answer these questions I wish to say that the conditions I intend to point out not only prevail in the United States, but so far as I know all over Europe and probably all over the world.

Every layman will answer the first of the above-stated questions correctly, and that is in the negative. Extractions, crowns, fillings, bridges, plates are so much associated with the dentist's activities to the exclusion of everything else that young or old, male or female will answer something to that effect when asked what is the chief work of a dentist. For many "tooth extractor" or, to be more correct, "tooth puller" seems to be the only correct definition for dentist.

Why the dentist is not doing more

preventive work and consequently saving more teeth from destruction requires a somewhat more detailed answer.

In my opinion the principal reasons are:

1. Because the general public has not been taught to appreciate adequately the value of the preservation of the teeth, and when the dentist is visited the ravages of decay have already begun.

2. Because patients are not willing to pay a reasonable fee for prophylactic treatment, which, when properly performed, requires frequently a great amount of time and energy.

3. Because the advertising parlors have given the public wrong impressions and conceptions. Leaving entirely aside the ethical aspect of the question of advertising, the advertisements have been so styled and arranged as to be misleading. This is such a well-known fact to every man in the profession that illustrations would be absolutely superfluous.

4. Because of the charlatans—illegal practitioners.

It is one thing to point out faults, and another and more difficult thing to correct them, but is not the first step to remedy unhealthy conditions a correct diagnosis?

Having enumerated the principal causes for the deplorable conditions generally found in the mouths of the people and the deplorable condition found in the dental profession, I shall now try to suggest the remedies by a mere process of logical deduction:

1. As the evil is so widely spread it is obvious that one alone cannot check or overcome it; the intelligent co-operation of all honest-minded men in and outside of the profession is required.

2. Education of the public so that the people realize that the preservation of their teeth is of the utmost importance for their general health, that no part of the human body can be neglected without affecting the efficiency of the entire human mechanism, that the teeth form an integral part of the human economy just as any other organ, that the teeth



the same as all other structures of the body are supplied with nerve, blood, and lymph vessels and are also subject to the same physiological laws.

3. Induce the people to think. A little commonsense will soon enable them to differentiate between the honest man and the charlatan.

I shall make myself a little clearer by illustrating this point.

Everyone knows that we do not obtain something for nothing, and anything that is worth obtaining must be paid for. A workman must be paid for his time and labor, a lawyer for his advice, etc., and the more the labor, the better the labor, the more the time spent, the better the advice, the more will have to be paid. That is merely just and equitable.

Everyone also knows that dentists the same as other mortals cannot exist on ideals alone. In order to keep their bodies alive, and also to keep their minds alive they need carbohydrates, proteins, salts, water, fats, shelter, clothing, etc., and all these commodities cannot be paid for with ideals but must be exchanged for something of a more concrete nature.

It follows then that when dentists advertise or make it appear as if they examine, clean, or extract teeth free of charge, their services are either not worth paying for, or that they must after all get their fees in some way or other, or that they are philanthropists and so well situated that they can afford to give and are actually giving their time and services for the benefit of mankind merely from altruistic motives. Whether or not the latter is the case can safely be left to the judgment and appreciation of the educated as well as the uneducated public.

The question of the advertising parlors and illegal practitioners is apparently taken care of by the State laws. But is not a law only effective when it is enforced? Is not a law merely a dead letter when it does not provide punishment in case of contravention? Are the

punishments provided for the violation of the laws appertaining to the practice of dentistry adequate? No, and therefore so many think it worth while to take chances.

The question has often been asked if all licensed practitioners are capable and if some illegal practitioners cannot perform some operations satisfactorily. A little analysis will clearly show that the public should in any case be warned against men who practice unlawfully.

First of all a license or diploma is less to be regarded as a distinction than as a safeguard for the general public; it points out to the public those men that are probably qualified to give them the services they seek. The object of a dentist's license is the same as a physician's, a teacher's, or a plumber's—it is to safeguard the public.

Secondly, even if an illegal practitioner could perform some operations satisfactorily, it would be only wise and prudent to shun him. Not only professional skill but also an honest character are essential requirements for a practitioner. It is only fair to assume that a man who practices in violation of the law will not show himself more scrupulous in the treatment he accords to his patients.

In summarizing I wish to say that education of the public and the exposure of the true conditions is the greatest and best remedy for all the evils enumerated. Honest men will profit by it, and the quacks will meet with their deserved fate. The people will preserve their teeth and their health, they will make more visits and fewer payments to dentists, and the dentists will have more patients and fewer artificial restorations to make. Everybody will be benefited. But as long as patients will only pay for restorative and not for preventive work, it is only natural that work will frequently be done in their mouths which is not necessary and often very injurious.



## A Practicable Root-canal Technique.

### VIII: Surgery.

By ARTHUR B. CRANE, D.D.S., Washington, D. C.

(Continued from page 611.)

**M**ANY infected teeth which fail to respond to root-canal treatment, as well as those which the diagnosis eliminates as unfavorable for the attempt, may be saved by surgical procedure. As any surgical operation is rendered more certain of successful termination when performed under satisfactory anesthesia, a word upon that subject may not be amiss.

Conduction anesthesia raises dentistry to the *n*th power, yet many will not take the pains to thoroughly master the comparatively simple technique. There are a number of books published which place this modern method within the easy reach of all. For any surgical interference in the periapical region it at once furnishes a prolonged anesthesia, and avoids the possibility of scattering the infection.

For root resections, in addition to conduction anesthesia, there should be an extremely slow infiltration of novocain solution rich in suprarenin immediately under the apical periosteum. This will make anesthesia more prompt and give a comparatively bloodless operation.

#### PERIAPICAL DRAINAGE.

As previously stated the establishment of periapical drainage is often a valuable aid in root-canal procedure. Dependence upon antiseptics to accomplish in the mouth that which has proved to be impossible in other parts of the body will lead only to failure. Success lies in a more universal adoption of surgical principles.

To establish periapical drainage a horizontal incision about half an inch in length is made over the root end. The soft tissues are reflected upward and downward exposing the alveolar plate. With small sharp chisels a window is then made about one-eighth of an inch in diameter, exposing the cancellous bone. With a stiff sharp probe punctures are made to the root end, thus permitting drainage. The lips of the wound should be prevented from uniting by means of a gauze wick changed daily, until all discharge ceases. This treatment is indicated whenever the inflammatory reaction becomes excessive and in all pus cases whether acute or chronic.

It is improbable that any periapical infection which has once reached the stage of pus formation or liquefaction of tissue can long persist without destruction of the apical fibers of the pericementum. Proliferating infections have the same result and in the presence of much dead apical cementum thus produced little is to be expected of medicinal treatment. We may heal the sick but we cannot raise the dead, and an infected necrotic area calls for surgical interference.

Root resection is not a panacea for all teeth with periapical areas of infection. In selected cases, however, it gives a reasonable percentage of successes. It is unwise to attempt it in teeth whose gingival cementum has been exposed to any extent by pyorrhea, or in teeth which cannot be freed of the odor of putrefaction. Several days prior to the operation, the canal should be opened as thor-

oughly as possible, and treated by Howe's silver reduction method or a dressing of formo-cresol. Powerful and escharotic drugs may here be used, as any tissue which may be deleteriously affected is to be surgically removed. Just prior to the operation the canal should be filled with copper amalgam, using the utmost care to secure a thorough condensation.

#### PREPARATION OF PATIENT.

An aseptic operation is possible and desirable. The patient's head should be covered with a sterile cap and the chest and shoulders covered with sterile towels. A folded sterile towel should be laid over the eyes and nose and another across the chin under the lower lip, and both secured to the cap with safety pins. An oblong sponge made by sewing a wad of absorbent cotton in a small J. & J. napkin is now placed between the jaws and the patient instructed to close the teeth upon it. This will serve to absorb saliva and blood and make the use of a saliva ejector unnecessary. A square of gauze folded once on the bias is now placed over the nostrils and under the upper lip, the free ends being tucked under the towel which covers the eyes. The teeth and mucous membrane in the neighborhood of the infection are now rubbed dry with gauze to remove the mucus, and the whole field painted with tincture of iodine. It is understood, of course, that the hands of the operator and assistant have been sterilized and that sterile gowns, or at least sleeves, are worn; also that all instruments used are sterile and handled in an aseptic manner.

#### TECHNIQUE OF RESECTING THE ROOT.

The incision should be made rather low, that is to say, below the line of the alveolar-labial juncture, and should be from a half to three-quarters of an inch in length. It should be made straight and the point of the knife should sink to the bone so as to incise the periosteum. By blunt dissection the muco-periosteum is freely loosened from the bone, upward

and downward. The labial flap should be retracted. This may be done with a fork retractor, but the method advanced by Sausser of passing a silk suture through the edge of the flap and making a loop of this to retract the tissue is often more satisfactory and causes less traumatism. The blood should now be sponged away by the assistant until the wound is dry enough to give a clear view of the condition of the alveolar plate. This may be intact or may have undergone any degree of disintegration depending upon the type of disease present. In cyst cases it will often be thinned out to a parchment-like consistence. In Class II cases it will often be cheesy and discolored. Whatever its condition a sufficient amount should be removed to assure ready access to the root apex. If the bone is normal this is best done with a bone gouge and mallet. The operator should direct the gouge, while the assistant uses the mallet. Where the bone is softened or thinned out, the window may be nicely made with large spoon excavators.

The field should be again dried of blood and the periapical condition studied. Usually the infected tissue which invests the root apex will now be disclosed to view. In cases of Class I and Class II it will appear as a velvet-like mass of granulation tissue. This should be thoroughly curetted away with small curets or large spoon excavators. The wound is then washed out with small sponges soaked in Ringer's or physiological salt solution, exposing the root apex to careful examination. Not infrequently the infected tissue will lie lingually to the root apex, in which case the root apex must be resected before the soft tissue can be curetted.

When the disease is of Class III, upon the removal of the overlying thin plate of bone, the cyst wall will be readily recognized by its homogeneous structure and yellow or bluish-gray color. The attempt should be made to enucleate the cyst in its entirety without rupture. In order to accomplish this it is essential that the window in the alveolar plate should be made large enough for its pas-



sage. The thinner portion of the bone may be readily lifted out with spoon excavators but the thicker bone surrounding must be cut away with bone gouges and mallet until the full extent of the cyst is visible. The root apex is now resected just below the point of attachment of the cyst wall. By careful blunt dissection the cyst may now be freed from its bony capsule and removed unbroken. Suitable blunt dissectors for this work may be selected from the ordinary amalgam instruments.

In cases of Class I and Class II the apex should be resected just coronally to the point where healthy pericementum

sponges and then packed firmly with dry gauze until hemorrhage is controlled.

A final inspection is now made for diseased tissue which may remain, and assurance that every vestige of necrotic cementum has been removed. When the wound is clean, the cavity for the amalgam filling may be prepared with inverted cone burs, starting at the canal and working to the cementum. Much skill is necessary to confine the amalgam within the cavity, and often the edges of the filling will be ragged and small particles will fall into the wound, from which it is practically impossible to recover them (Fig. 1). There is considerable difference of opinion as to the advantage of this procedure and after three years' trial, I have abandoned it in favor of the following method: The root stump is dried and carefully painted with a saturated solution of silver nitrate, being careful to avoid contact with the surrounding tissue. The cut surface of the dentin is then thoroughly bur-nished with a silver burnisher and the wound washed out with salt solution.

FIG. 1.



Some ragged amalgam fillings.

begins. This will be indicated by intimate contact between the bone and root. The best instrument to use for this purpose is the cross-cut fissure bur. Chisel and mallet have been advised, but these do not permit of the same nicety of control as does the bur. If an amalgam filling in the stump is desired the cut should be made in such a manner that the stump is shorter labially than lingually. This will facilitate the preparation of the cavity. After the apex has been removed, the whole diseased area should be curetted down to healthy bone. In some cases of Class II projections of granulation tissue will be found extending from the central mass into the bone in various directions. These should all be followed up until no vestige of abnormal tissue remains. The cavity thus made is again washed out with wet

#### CLOSING THE WOUND.

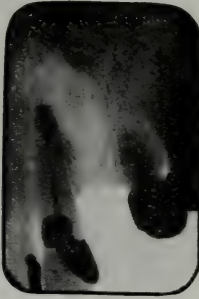
Before closing the wound a careful examination should be made to be certain that no foreign body, such as sponges, scraps of amalgam or bone chips, remains. In cases of Class III where the cyst has been enucleated without rupture, provided asepsis has been maintained, the wound may be immediately completely sutured. In other cases, however, it seems more in keeping with surgical principles to only partially suture the wound, leaving space for the insertion of a gauze wick for drainage.

The wound should be closed by interrupted sutures of black silk and these may be removed on the fourth or fifth day. Where indicated, drainage should be maintained until the wound will no longer retain the gauze. This will require that the patient be kept under observation for a month or even longer. A radiograph should be made soon after the operation and another after six months or more have elapsed (Fig. 2).

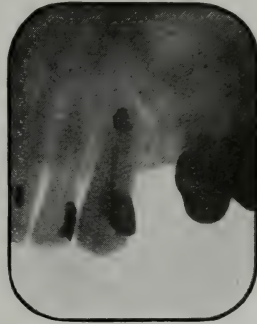


A regeneration of bone will be indicative of a successful outcome (Fig. 3). though the other root or roots may be curable. If such a tooth can be made

FIG. 2.



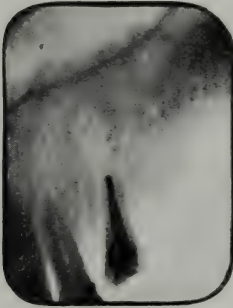
A



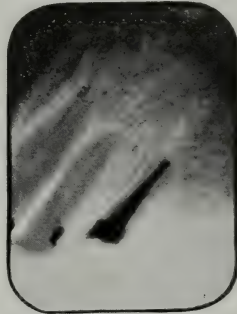
B

A good result with amalgam filling: A, A few days after root resection; B, same, one year later.

FIG. 3.



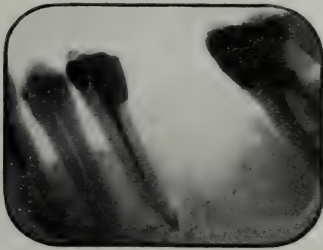
A



B

Apparent bone regeneration about resected roots (new technique): A, A few days after root resection; B, same, four months later.

FIG. 4.



A



B

Examples of tooth bisection.

#### TECHNIQUE OF TOOTH BISECTION.

Molar teeth are often extracted because one root is hopelessly diseased, al-

valuable by a crown or used as an abutment for bridge work it is generally worth saving by tooth bisection (Fig. 4).

In preparing a tooth for this opera-

tion the root which is to be eliminated should have its canal dressed with formocresol sealed in with permanent cement. This will prevent contamination of the other canal or canals while they are being treated and filled. A good radiograph

FIG. 5.



Spike left by failure to start bisection exactly at point of bifurcation.

made after the root filling will be of great assistance in planning the operation.

Straight incisions should be made in the buccal and lingual gum from the gingiva at the point of bifurcation toward the root end, about one-eighth of

an inch. Deflecting the soft tissues the tooth is bisected with a pointed cross-cut fissure bur. The cutting should begin in the bifurcation and proceed coronally. It is more satisfactory when this can be done by cutting from one side only, but it generally will be necessary to cut alternately from the two points of incision. If the bisection does not start exactly at the point of bifurcation a small spike of root will be left which will make the tooth permanently tender (Fig. 5). The cutting should continue through the crown including all that part which is immediately supported by the diseased root. When completely severed, the root may be extracted, and the socket curetted and wiped out with tincture of iodine. The portion of the tooth which remains should now be made as smooth as possible subgingivally, which completes the operation.

In crowning bisected teeth it is best to cut them off to the gingiva and use post and plate crowns with an occlusal rest on the tooth proximal to the missing root.

921 15TH ST., N. W.

(To be continued.)

## Lock Pins for Cast Gold Fillings, Used as Abutments for Bridges.

By H. HERBERT JOHNSON, D.D.S., Macon, Ga.

**I**N this day of infection worries, every one appreciates the importance of preserving the vitality of all teeth in our various operations for restoring and replacing those that are lost. Not all of us are ready or willing to denounce all fixed bridge work as an abomination and health destroyer. Many of us are still capable of seeing the two sides of the question, weighing each and profiting by the good in each for the service of humanity.

Those of us who are still making some

good, well-fitted, well-finished, serviceable bridge work, that is usable in the mouth (not in the pocket), also fully realize the many difficulties in the way of producing real practicable fastenings for abutment pieces which will not endanger the life of the pulp.

With this object in view, I wish to advance the following ideas which have been successfully tried in practice, covering a period of time sufficient to prove them practicable.

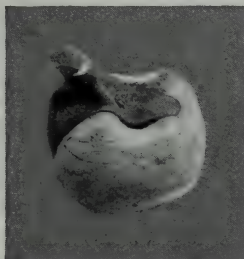
The first is what I would term the

lock-pin cast filling and is a most reliable abutment piece for bridges. Let us take for instance a mesio-occlusal cavity in a second molar and the same in a first bicuspid to which are to be swung molar and bicuspid dummies.

Prepare the cavities in the usual way, being careful to avoid approaching

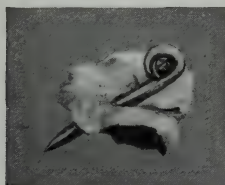
take the impression. Make up the bridge in the usual way and we have two cast filling abutments with no parallel (?)

FIG. 1.



the horns of the pulp at any point. While the wax molds are still in the cavities take a small piece of carbon (pencil lead will do) and after carving it down to about 18 or 20 gage insert it into the wax mold (see Fig. 1) pushing it through at an angle of about forty-five degrees commencing on the occlusal surface of the filling, and directing it to strike a point in the distal wall of the

FIG. 2.



cavity in a direction away from the pulp. Leave the end of the carbon point projecting, remove and invest the wax mold with the carbon point in place. Make the bicuspid attachment in the same way.

When the fillings are cast break off the projecting points of the carbon, insert the fillings in place in their respective cavities in the teeth in the mouth and

FIG. 3.



pins to bother with and which will likely go to place quite easily. Cement the piece in place and allow the cement to set.

FIG. 4.



The anchorage at this time is not sufficient to sustain the bridge in position very long. However, it can be made so, as follows: After the bridge is firmly set, take a No. 2 round bur and drill out the two carbon points left in the abutment fillings, making a forty-five degree



angle hole through the filling. Then drill a cavity through the hole in the filling into the dentin a very slight distance (Fig. 2). Pump into these holes in the fillings thinly mixed cement and then quickly thrust a 20-gage wire into the hole through the filling and on into the dentin. When the cement has set cut off the wire at the surface of the filling. The locking pins being set at extreme angles makes it impossible for such anchorages to break their cement fastenings and come out. These locking pins may be varied according to the mechanical judgment and ingenuity of the operator. One for each filling is usually sufficient, but sometimes two crossed and directed buccally and lingually (Fig. 3) may be used.

Another method of making an interlocking abutment filling is as follows: Prepare the mesio-occlusal cavity in the molar in the usual way, then deepen it at the distal wall into an undercut of slight depth (Fig. 4). If this undercut is properly formed the wax mold can be

removed without distortion by raising it out of the cavity from the mesial side first, then lifting it upward and forward. The filling will thus have a projecting point at the back that fits into the undercut. Cast the bicuspid abutment for the lock pin arrangement as previously described. Place the fillings in place, take the impression and make up the bridge. When the bridge is ready for cementing place the molar end of the bridge in position first and then bring the bicuspid filling down into its cavity. When the bridge comes to place the molar end will be locked by the projection on the posterior end of the filling. Now put the locking pin in the bicuspid filling and the bridge will be immovably fastened at both ends.

These methods are far ahead of the old parallel pin fastenings that so often encroached upon the pulp, either eventually killing it or rendering it chronically sensitive.

COMMERCIAL BANK BLDG.

## The Artificial Restoration of Ears by Plastic Means.

By HARRY B. WRIGHT, D.D.S., Philadelphia, Pa.

**F**REQUENTLY one is confronted with the problem of the restoration of parts of the facial anatomy other than the mouth. Dentists as a whole should be capable of making such restoration owing to their intimate knowledge of the anatomy of the face and the various methods usually employed in artificial restoration of the tissues.

Such a problem presented itself to the writer in March 1919.

The patient, a young man nineteen years of age, in good health, robust and well developed, had a congenital absence of both ears and external auditory meati, the only evidence of Nature's attempt

being a vertical fold of fibro-cartilaginous tissues (see Figs. 1 and 2). The temporo-mandibular articulation was also at fault, there being a partial subluxation during the wide opening of the mouth.

Casts were made of a material composed of nine parts of plaster of Paris to one part of Portland cement, which gave a very hard and durable form upon which to make the models of the ears.

### WAX MODELS.

In making the models, the following conditions were observed: Due to the

FIG. 1.



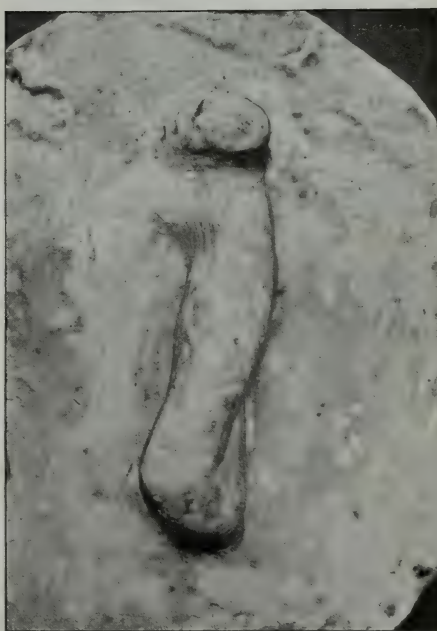
FIG. 2.



FIG. 3.



FIG. 4.



fact that a fold of tissue was in the way, a typical ear could not be made that would conform to the tissues without indicating the presence of the fold. It was then necessary to utilize this fold by making it serve as a support for the artificial ear (see Figs. 3 and 4). We were also confronted with the difficulty of matching the ears and making them conform to the face with regard to shape and size. Several wax patterns were

#### MIXING THE PLASTIC MATERIAL.

To twenty-eight to thirty parts pure pressed gelatin (colorless) an equal amount of distilled water was added and allowed to stand for several hours until a soft gelatinous mass was formed. Fifty-five parts by weight of glycerin and three parts of gum-arabic were then added and the mass heated in a double boiler, until all the ingredients were

FIG. 5.

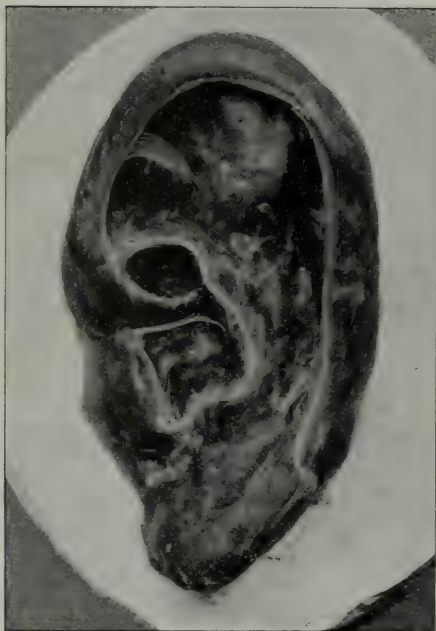


FIG. 6.



carved in various sizes and shapes and tried on until the ones most suitable were obtained. (Figs. 5 and 6.)

A core was then made of the same material as the cast to relieve the undercut, and the second half poured over the model. A funnel-shaped vent was made in the mold through which to pour the plastic material. The molds were allowed to harden overnight, and after boiling the flask thus formed for five minutes to soften the wax the molds were separated. Boiling water was allowed to flow over the inner surfaces to expel the remaining wax.

thoroughly dissolved, stirring the mass all the while. More water was then added to clear the mixture and the coloring matter added.

#### COLORING MATTER.

The powdered forms of ivory white or oxid of silver, ochre and carmine were used as the coloring matter, the basic color being the ivory white while the ochre and carmine are used as the blending colors. To get the required shade the colors were first mixed on a palette with water and in definite proportions until



the required shade of the skin was obtained. A batch of the colors was then made up in the same proportions, and finely macerated. This was slowly added to the boiling mass, stirring constantly until the ingredients were thoroughly incorporated and until the color on the palette was reached. The secret of success then lay in knowing the consistence to which to boil the material. A very good result was obtained by repeated testings, allowing specimens at various times to harden on a glass slab and noting the quality. Usually a very thick mass makes the best product.

When the desired consistence was reached, the material was strained and poured into the molds which had been thoroughly vaselined and clamped. The material was allowed to run in a thin stream and teased in with a wire, jarring the mold constantly to exclude air bubbles.

When cool, the molds were separated and the molded ears gently teased from the matrix.

Uneven markings can be smoothed over with a heated spatula, and when thoroughly cool the specimen is wiped free from all grease and a coating of the desired shade of theatrical face powder gently rubbed into the surface, which gives a very soft texture to the ear resembling, remarkably, the natural skin.

In attaching the appliance to the skin surface the following procedure was employed: The skin and surface of the appliance to be attached were cleansed with alcohol, and the surfaces then coated with ordinary theatrical spirit gum, which is allowed to evaporate for a minute. The appliance is then pressed against the skin, holding it in place for about five minutes. The adhesion which takes place is surprising. Powdered rouge, touched to the lobes and outer ridges of the ears, will lend a natural hue. In this case theatrical make-up in the powdered form was used.

As there is always the possibility of the appliance becoming frayed and soiled through the general routine of living, the flasks were given to the patient, together with a quantity of mate-

rial, with definite instructions for removing, preparing and attaching the appliance should the occasion demand.

A theatrical make-up outfit was also given to the patient with instructions as to its use.

The same process can be used in the restoration of other parts of the face, including the nose and associated ex-

FIG. 7.



ternal parts. The material is friable but will retain its shape, and while being impracticable so far as being subjected to the wear and tear that the natural tissues are, still as a cosmetic restoration it is unsurpassed.

It is regrettable that the writer cannot show a photograph of the finished result. Unfortunately, the patient when told to come the following day to have a photograph taken, failed to present himself. However, a photograph of the finished restoration is shown in Fig. 7. The patient's gratitude is unquestioned, but being a shipyard worker it is thought

that he either met with an accident while at work, or else has been transferred to some other shipyard, as frequent communications failed to elicit any response.

The writer while not attempting to claim anything new in the way of artificial restoration, similar procedures having been followed in the late war,

merely wishes to show what can be done by dentists toward the relief of the afflicted and malformed.

The author here wishes to extend his thanks to Drs. G. C. Speirs and Hermann Prinz for valuable suggestions, in the pursuance of this work.

1419 SPRUCE ST.

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## Histo-pathology of the Cementum as Related to Pulp-canal Surgery.

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By W. CLYDE DAVIS, B.Sc., M.D., D.D.S.

UNIVERSITY OF NEBRASKA COLLEGE OF DENTISTRY, LINCOLN, NEBR.

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IN examining several thousand roentgenograms for diagnosis I have been impressed with an occasional case wherein the canal filling was short of the apex of the tooth by from one to three mm. and with apparent health of the subdental tissues. In clearing mouths for dentures in the clinic of the Dental Infirmary of the University of Nebraska, I have been able, following extraction, to examine some of these teeth, and I have found them to be without any evidence of disease and with a complete membranous attachment over the entire surface of the roots.

I finally concluded that the solution would be found in a microscopical study of the cementum of the apical third of the roots of the teeth so filled, and which showed every evidence of health. The result has been a surprise to me.

I therefore desire to make a preliminary report of my findings at this time. It will be followed with a more extended and detailed report at some of our dental conventions during the summer.

I have examined over one hundred cases, made sections, and mounted them for permanent evidence. I have many cases wherein the pulp-canal filling fell short of the apex from one to three mm.,

and where the remaining portion of the canal had been entirely filled with cementum or dentin, or calcic matter, separate or in combination, so that there existed no opening to the canal at the time of extraction. This has taken place both in cases of single and multiple foramina.

I have in my library most of the writings of Noyes, Black, Hopewell-Smith, Talbot, Gardiner and others, as well as files of the leading dental journals covering the past thirty years, and I have so far failed to find any statement that the cementum does or does not close the foramen, either in health or under pathological conditions.

I have not yet found a case wherein the foramen was closed except when the pulp had been removed. However, I feel sure such cases must exist as a result of senility.

I have found the cementum a most active and vital tissue, even though the pulp has been removed, provided there is no history of the use of caustic drugs or indications of destruction due to infection.

In infected cases I find in some instances a marked effort on the part of the cementum to close the foramen, but



in all such cases I find one or more openings persistent, even though there is a marked hyperplasia of the cementum.

With the evidence thus far obtained, it would seem that the great damage which has resulted from root-canal surgery, has been caused by the use of arsenic in devitalization, the use of caustics in pulp canals and septic surgery.

To date, all cases which have been capped with hyperplastic cementum show the following history:

Pulp has been removed in most instances under an anesthetic, either general or local, including so-called pressure anesthesia.

Where arsenic has been used, the patient recalls a sensation of pain at the time of pulp removal.

No root fillings in these cases have reached beyond the dento-cemental junction in the canal. Most canal fillings have fallen short of the foramen from one to three mm. and some as much as five mm.

No cases have a history of the use of caustic drugs, which would be in any way dangerous to the live cells near the apex of the tooth.

No cases yet have been found wherein the foramen was closed, which gave a history that would indicate a diseased condition of the subdental tissues or the use of drugs or a mechanical procedure which would injure the tissues at the apical end of the canal.

In cases of septic or medicated canals, I have several slides showing a strong effort on the part of the cementum to close the foramen, but there still remains an opening.

The younger the patient after the completion of growth, the more active the healing. I have slides showing cementum packed tightly against the gutta-percha canal point, well up in the canal, entirely surrounded with dentin. This is a point I would like to have our students in dental histology note particularly.

The discovery of a complete closure of the canal near the apex where we ordinarily find osteoblasts, was a great surprise to me.

However, to find cementum well up the canal was a greater surprise, and in-

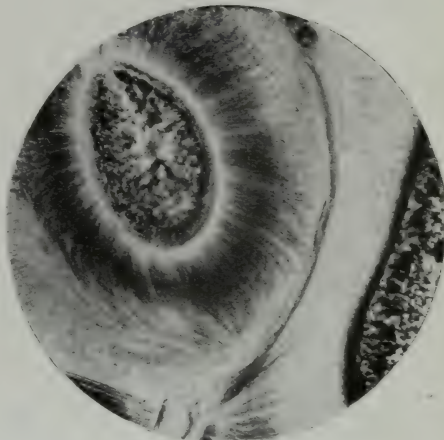
FIG. 1.



CASE 109. Roentgenogram of tooth before making section marked  $\times$  shown in Fig. 2.

volves the migration of these highly specialized connective tissue cells, which

FIG. 2.



CASE 109. Sec. C. Near the edge is shown a small section of cementum, which encompasses the entire specimen. Next to this is a layer of normal dentin. Inside of this appears what was the original canal, filled with secondary dentin, central portion of which is filled with cementum. This section was taken from the tooth in the position marked  $\times$  in Fig. 1. This central portion grows smaller until it entirely disappears in the last section in the root end.

I did not think possible, so far within the canal.

In so far as this research work has progressed, the complete closure of the



canal is quite common, at least provided the pulp has been removed aseptically while vital, and just short of the canal end.

I will be glad to receive extracted teeth of this description for further study, provided they are accompanied with a history of the pulp removal and treatment, together with roentgenograms taken before extraction. It will assist in the work if the dentist will include many particulars about the patient, as to age, health, length of time pulp-canal filling has been in place, etc.

Again, if anyone knows of any literature previously published, bearing directly on this point, they will do me a favor to advise me.

I herewith show in Fig. 1 a roentgenogram of such a case, which was extracted before the picture was taken. I am also without any history in this case.

Figure 2 shows one of the slides from a section in the region marked X. I am showing this particular case because it is so marked. I have several dozen equally positive under the microscope.

At the periphery of the cut will be seen a small field of the external cementum, which of course, entirely encompasses the section. Please compare it with that which fills the space of the pulp canal.

This microphotograph is magnified many times. This will be realized when it is learned that this canal is smaller than the finest nerve broach, and with the naked eye looks like a mere speck in the specimen.

In the sections nearer the apex of the tooth, this canal grows smaller until it all but disappears in a black spot about one-half the size of a lacuna.

OLIVER BLDG.

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## CORRESPONDENCE

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### A Case of Urticaria Produced by Novocain Anesthesia.

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TO THE EDITOR OF THE DENTAL COSMOS:

Sir,—I administered  $\frac{3}{4}$  gr. of novocain in 2 per cent. solution to a lady patient of middle age for extraction of upper right second molar, March 31, 1920 (about 3 P.M.).

That evening she presented marked urticaria quite general over her body, which the following evening increased to a marked angio-neurotic swelling and still continues.

I have since learned that she took one

5-gr. aspirin tablet before coming to my office.

I am aware of the fact that aspirin has been known to produce such effects, but she has taken aspirin before with no such results.

She has experienced absolutely no discomfort about the tooth socket since extraction.

Yours sincerely,

H. G. STENDERSON.

EXCELSIOR, MINN.

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# PROCEEDINGS OF SOCIETIES

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## The Eastern Association of Graduates of the Angle School of Orthodontia.

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Tenth Annual Meeting, held in New York City, May 5 and 6, 1919.

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(Continued from page 542.)

### TUESDAY—*Afternoon Session.*

The session was devoted to Clinics and Reports of Cases.

Dr. HENRY C. FERRIS, New York City. I would like to present a record of a treated case Class III (Angle), a boy three years of age. This child was one of the most difficult cases that I have had to treat in my twenty-seven years of practice. He was underdeveloped and poorly nourished, and under the care of a child specialist for dietetic observation. Owing to his inability to masticate and insalivate his food, it was necessary to pass it through a ricer before feeding. He had no natural appetite nor desire to eat, and had to be coaxed an hour at each feeding. Continual medication was required for intestinal evacuation. He was extremely bright mentally for his years, exhibiting great determination. The child was in such a nervous condition that it required three sittings at the photographer's to procure the original pictures. It took twelve visits before I could introduce a separating wire between his teeth, and the parents were about discouraged. The family physician anesthetized the youngster, while I fastened the ligature wires. This experience cured the little

fellow—I had no particular trouble with him after that.

I used a removable lingual arch, with locks on the lower molar bands, carrying an inclined plane over the incisal edges, and jumped the bite. Later, I used intermaxillary force for about a month. His excessive nervous manifestations were gradually reduced. At the end of a year normal functioning of his teeth and jaws was accomplished, and his appetite became normal; and he was able to reduce solid food. His weight increased 6 lbs. Figs. 1 to 7.

Next I wish to report a record of a case of rachitis, Class I, with ear-marks of Class II Division 1 (Angle), where the mandible in the incisal region is underdeveloped. I am showing this case to stimulate discussion, rather than as a complete record. Figs. 8 to 12.

You note the underdevelopment in the anterior region of the lower arch. By the modification of the arch formation, the retraction of the superior and inferior incisors, the shape of the face has been greatly modified, but the underdevelopment of the mandible in the incisor region is evident. What would you do with this case at this stage?

**A Member.** How long have the appliances been off?

**Dr. Ferris.** Over a year. This is a child from abroad.

**Dr. Ferris.** Yes, I banded the four central incisors to which was soldered a

FIG. 1. (CASE I.)

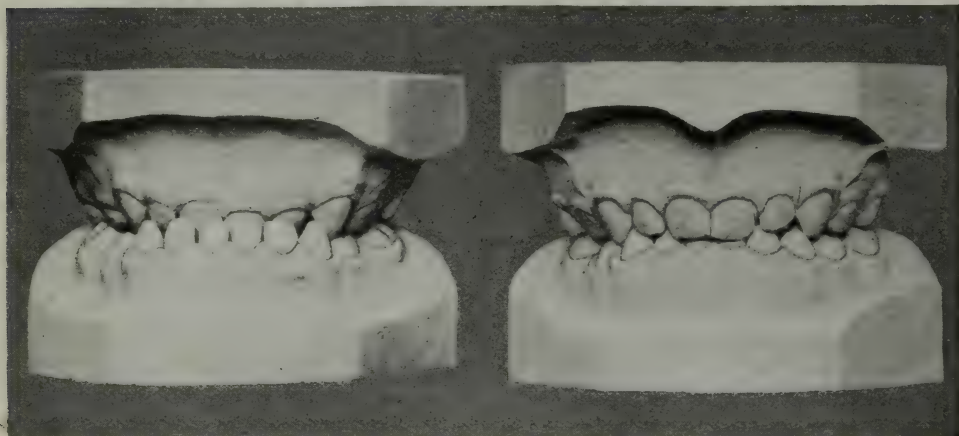


FIG. 2.



**A Member.** Have you used anything to give the molars and bicuspids a chance?

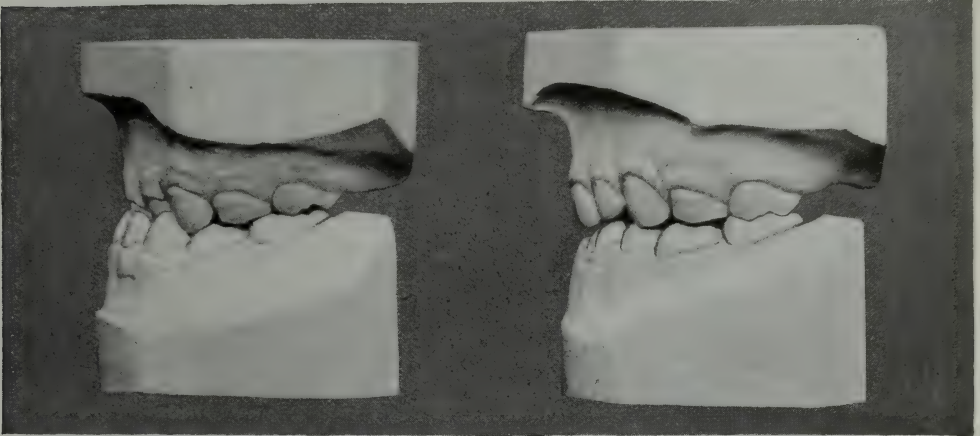
metal inclined plane which was worn about four months, opening the bite. The mesio-distal occlusion of the molars



was not altered only by rotations. I have not seen the patient for a year and a half, but the family have reported that

anterior tooth must go back, or the lower molar must come forward. That would permit the mandible to come forward.

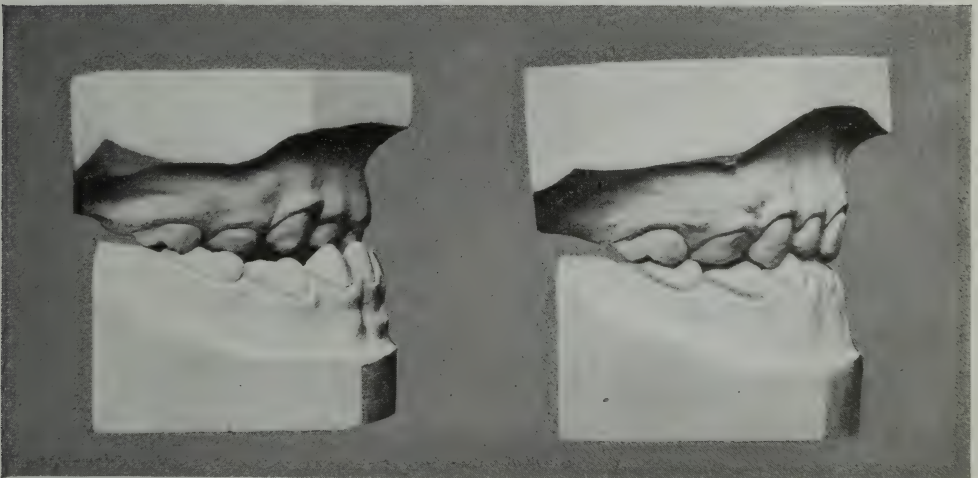
FIG. 3.



there has been very little change. The main point is, Can we do anything with that mandible?

**Dr. Ferris.** You think the mandible is held distally by the inclined planes of the molar region?

FIG. 4.



**Dr. Grieve.** The second premolar is rotated, and there is considerable space behind the bicuspid. Either that upper

**Dr. Grieve.** Yes.

**Dr. Ferris.** I do not believe that is so, as the molar occlusion mesio-distally

FIG. 5.



FIG. 6.



Before.

After.

FIG. 7.



FIG. 8. (CASE II.)

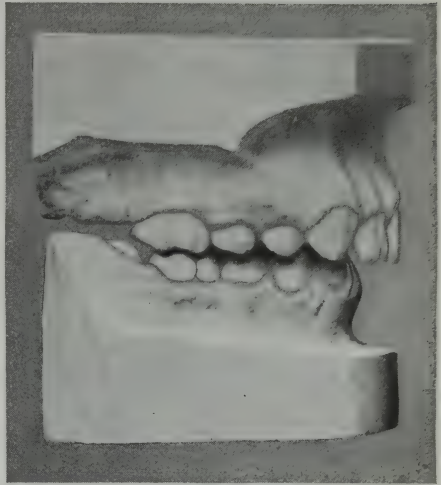
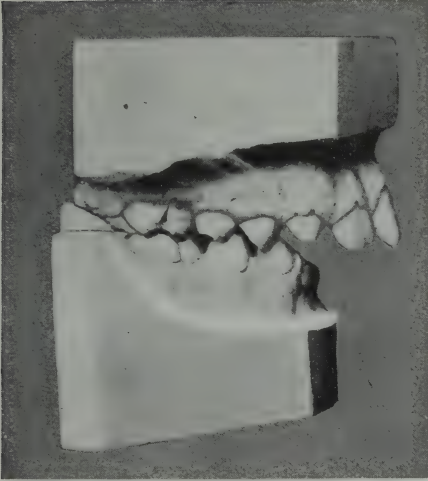


FIG. 9.

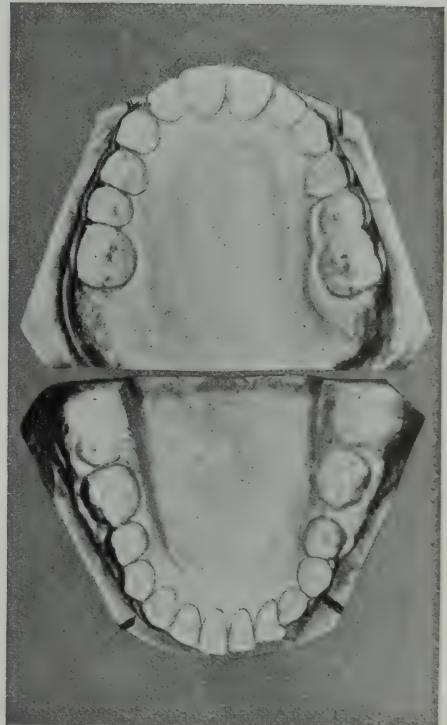
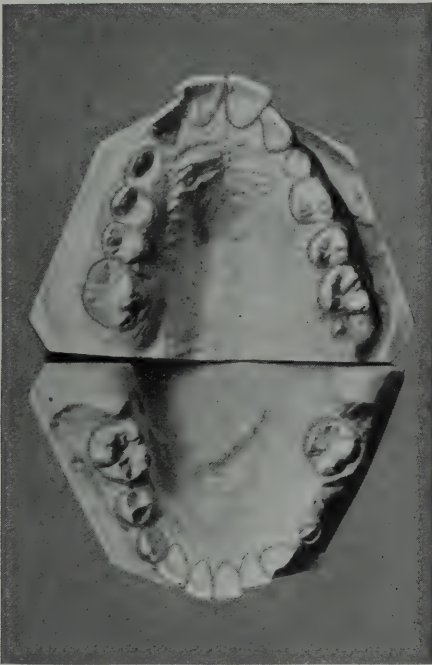




FIG. 10.



FIG. 11.



FIG. 12.



has not been altered. The only movement of the molars has been that of rotation and that is not complete. The mandible is underdeveloped. If anything, the superior incisors are all forward of their normal position. They will all drift distally under lip pressure, after expansion in the region of the first premolars. How can you stimulate the mandible in its incisal region?

**Dr. Grieve.** I still think the upper teeth should come forward. Bring the molars and premolars forward, and then let your mandible come forward. You can do that with an anchorage to the lower teeth.

**Dr. Ferris.** How can you bring both the superior and inferior molars forward with an anchorage on the lower without retracting the mandible?

**Dr. Grieve.** They will come forward in development. The open space is on the upper jaw, so as to allow the superior teeth to travel mesially, if they will.

**Dr. Stanley.** I do not believe that mandible is distal. I think your inharmony is between these two points (Illustrating). The arches have not harmonized themselves as yet.

**Dr. Ferris.** Don't you think the mandible is distal in the finished picture?

**Dr. Stanley.** The head is tilted forward. A number of years ago, I asked to have presented the photographs of a child of twelve, or younger, that would show an undeveloped mandible. I have looked everywhere for that. If you put the screens on them, even in the little four-year old in Dr. Angle's book, the appearance is that it is underdeveloped.

**Dr. Ferris.** I hope the further record will bear out what you say; but I feel at the present time the mandible in the incisor region is underdeveloped. To satisfy myself on this point, I have radiographed a number of cases since and found the mandibles underdeveloped. In this case the jaw was thin and sharp to the sense of touch. I will be glad to report this case later.

#### INSTALLATION OF OFFICERS.

**Dr. HATFIELD.** I take this opportunity of asking Dr. Kelsey and Dr. Kemple to conduct our president-elect, Dr. Johnson, to the chair.

**Dr. KELSEY.** It gives me great pleasure to present to you the one who will be the incumbent of the presidential chair when you have retired. We are especially pleased, as he has refused so long to become president.

**Dr. HATFIELD.** I assure you I relinquish this position with full confidence that the interests of the society will be cared for in the most effective manner.

**Dr. JOHNSON** appointed as Executive Committee, Dr. Wm. G. Law of New York, Dr. C. A. Hawley of Washington, and Dr. H. K. Hatfield of Boston. As member of Scientific Committee, Dr. R. B. Stanley, New York.

**Dr. BUTLER** moved that the next meeting be held in Boston, on the first Saturday in December. (The motion was carried.)

Adjournment.

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# THE DENTAL COSMOS

A. MONTHLY RECORD OF DENTAL SCIENCE.

*Devoted to the Interests of the Profession.*

EDWARD C. KIRK, D.D.S., Sc.D., LL.D., *Editor.*

L. PIERCE ANTHONY, D.D.S., *Associate Editor.*

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PHILADELPHIA, JUNE 1920.

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## EDITORIAL DEPARTMENT

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### Dental Scientific Research.

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It has been a clearly defined policy of the DENTAL COSMOS to spread the gospel of a scientific basis for all dental activities and a recognition of the essential importance of the scientific attitude of mind upon the part of the dental profession individually and collectively toward the problems comprised within the dental professional field.

Thirty years ago a plea for the scientific method in dentistry received scant consideration by the majority of the dental profession. The demand was for the so-called "practical," the thing that could be done by the hands and was measurable in terms of direct pecuniary advantage. Any abstract discussion of the causes behind phenomena was "theory," which in the popular conception was mere speculative guessing and unworthy of serious consideration.

The terms "science," "scientific," and "theory" have gradually



taken their normal places in the dental professional mind through the development of a correct understanding of their meaning; so that today they are not looked at askance or with suspicion but are accepted as the only true basis for dental progress as well as of progress in all other human activities.

Every department of dentistry is being scrutinized and revised in the light of scientific standards and by scientific methods of investigation. Prosthetic dentistry is conforming to the laws of physics and chemistry and the engineering problems which it presents are being solved in harmony with the laws of mechanics. So likewise in orthodontia the same scientific considerations apply even in relation to the less evident biologic phenomena involved in the tissue changes incident to tooth movement; for it has been said by an eminent physiologist that even biologic phenomena, including the mutations of protoplasmic activity, must finally be expressed in terms of chemistry and physics.

Roentgenology in its relation to dental diagnosis has made a profound impression upon standards and methods of dental practice. Upon the evidence, more accurately the testimony, of the radiograph teeth are condemned to extraction, or saved, in accordance with the skill and understanding of the interpreter of the radiographic record, in spite of the fact that the physical phenomena, by which the X-ray record is made possible, are an impenetrable mystery to the majority of those who apparently feel themselves qualified to make an expert reading of the record and reach a diagnosis therefrom.

Those who have the most precise knowledge of roentgenology agree as to its present limitations as a diagnostic means and are impressed with the belief that, notwithstanding its present value, the application and possibility of the X-ray are capable of immense development in scientific precision with a greatly increased accuracy of interpretation.

In operative dentistry and in dental therapeutics the field is limitless for scientific investigation and standardization, for in dealing with the life and health of the dental tissues the empirical method is too heavily weighted with danger to human life and health to be longer tolerated when scientific study and research offers the best as indeed the only way to intelligent, rational and successful therapeutics.

The scientific method no longer needs supporting argument, for it has justified itself by its results, but what does appear to be required is intelligent direction so that economy of time and effort may be secured in the attainment of practical results. The scientific research activities in dentistry may be classified as:

1. Research as an individual enterprise.
2. Research promoted and fostered by dental organization.
3. Research in the industrial activities related to dentistry.

The first group will always comprise those workers who are seekers after the truth for the truth's sake and whose major compensation is the gratification of the creative instinct in the workers in pure science to whom the revelation of the truth is its own reward, and to whom pecuniary compensation is an anomaly except in so far as it is an aid to the attainment of the main objective. These are the inspired ones who are the dreamers of dreams, whose visions may or may not be immediately convertible into terms of utility but are nevertheless invaluable to the degree or to the extent that they are interpretations of natural law in terms of human understanding. It is these inspired few to whom the phenomena of nature manifest themselves in the light of Walt Whitman's epigram, "The mountain and the pismire are equally wonderful,"—and verily they have their reward.

The remaining groups reflect the need for immediate utilitarian results that can be at once applied in practice, and it is in this field that it is evident that co-ordination and sympathetic co-operation would be most helpful in achieving the ends sought.

A vast amount of scientific research work is being done in the industrial field of dentistry which has its direct bearing upon the accuracy, the precision and rationalism with which dental therapy is applied in professional practice. Many of the so-called professional problems which are the subject of professional research and study are already worked out or are engaging the attention of workers in the industrial field, and if the sentimental, artificial barriers between the professional group and the scientific experts who are catering to their requirements were eliminated the way would be cleared for a more rapid scientific advancement in dental practice and the present wastefulness in time, energy, and brains involved in dental scientific research would be eliminated.

## BIBLIOGRAPHICAL

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A TEXTBOOK UPON THE PATHOGENIC BACTERIA AND PROTOZOA. FOR STUDENTS OF MEDICINE AND PHYSICIANS. By JOSEPH MCFARLAND, M.D., Professor of Pathology and Bacteriology in the University of Pennsylvania. Ninth Edition, Thoroughly Revised. Octavo of 858 Pages with 330 Illustrations, a Number of Them in Colors. Philadelphia and London: W. B. Saunders Company, 1919. Cloth \$4.75 net.

In considering this standard work with special reference to its value to those engaged in preparation for the practice of dentistry we may direct attention to the following:

The chapter on "Structure and Classification of Micro-organisms" contains some excellent illustrations of the types of organisms found in the oral cavity. Such photomicrographs are valuable aids in the morphological study of these organisms in stained preparations whether prepared from cultures or in smears taken direct from the oral cavity. The illustrations include representatives of the following groups which may be found in the oral cavity: (1) Rod forms; (2) the micrococci in their various characteristic grouping as (*a*) staphylococci, (*b*) diplococci (*c*) tetrads and (*d*) streptococci; (3) various forms of spiral organisms; (4) the leptothrix or long unbranched thread form; (5) the streptothrix or thread-shaped organism showing true branching; (6) the molds, and (7) the protozoön. These types may be

represented in the oral cavity by the following well-known organisms and many others: To Group 1 belong the *Bacterium tuberculosis*, the *Bacterium diphtheriticum* and the *Bacterium mucosum capsulatum*. To Group 2, the micrococci, belong most members of the pyogenic or pus-producing organisms including (*a*) *M. pyogenes aureus*, *M. pyogenes citreus*, *M. pyogenes albus*; (*b*) the diplococci of the oral cavity which include the pneumococcus, the gonococcus, the meningococcus and *M. catarrhalis*; (*c*) *M. tetragenus*; (*d*) *Streptococcus pyogenes*, *Streptococcus viridans*, *Streptococcus anginosus*, etc. Group (3). To the dental practitioner the most important members of this group are, first, the Vincent's spirals and the accompanying fusiform bacilli found in the so-called "Trench Mouth" of the recent war and frequently with other organisms in pyorrhea alveolaris, and *Treponema pallida*, the etiological factor of syphilis. Group (5). *Streptothrix buccalis*. Group (6). A very important member of this group from a dental standpoint is the oidium albicans or thrush fungus. Group (7). The protozoa include the amœbæ of which group the *Entamoeba gingivalis* has become quite familiar to the dentist since the publications of Barrett, Bass and Johns, and others, naming it as the etiological factor of pyorrhea alveolaris, a theory now quite disproven by careful theoretical and practical study. There can be no such thing as *the* etiological factor of pyorrhea alveolaris in general any more than there can be *the* etiolog-



ical factor in headache. The causes of the one are as varied as the causes of the other. We must therefore take exception to Dr. McFarland's statement when on page 338 in speaking of the *Entamoeba buccalis* he says, "It is at present thought to be the cause of Riggs' disease or pyorrhea alveolaris." The causes of pyorrhea are legion, among the most important being lowered resistance due to malnutrition, injury, malformation, etc., followed by the invasion of the part by pathogenic micro-organisms: bacteria, spirochetes, entamoebæ, etc.

There is also an excellent chapter on staining methods for various micro-organisms, the manner in which the stains are prepared and a classification of bacteria according to the differential staining method of Gram. All this will prove of great help in recognizing the various organisms when seen through the microscope, but it is far more important to have as clear a knowledge as possible of the pathogenicity of the various organisms with which we have to deal, to be able to recognize the general clinical symptoms produced by each and the lesions when characteristic and to understand how they are brought about, and how the invading organism may be combated and a cure effected. Much information can be gained on this phase of the work from the chapters dealing with the pyogenic bacteria, the pneumococci, etc.

The subject of infection has been clearly treated by consideration of the modes of infection by various bacteria and their virulence as well as the question of susceptibility of the host and other predisposing causes of disease. Also the question of immunity of the various types and the preparation and application of the various immune sera, vaccines, etc.

It is gratifying to find the author condemning the use of stock vaccines, now so widely used, in the treatment of cases when it is possible to use those of the autogenous type.

There is an excellent chapter on anti-septics, germicides, disinfectants, etc., suitable for various uses and a table giving the strength at which the more common ones are used.

Although the book was written primarily for the medical profession, we have here given consideration to those points which are of especial interest to the dentist.

The aim of the first-class dental college of today is to so train its students in physiology and pathology that upon graduation they shall be equipped with a knowledge of the fundamental principles governing the function of the whole human machine both in health and disease. The doctor of dentistry is justly expected to work in co-operation with the doctor of medicine, sharing with him a knowledge of the normal functions of the body, the dangers to which it may be exposed from pathogenic factors and its reaction to them, a knowledge of the inter-relation of resistance of the individual on the one hand and the potency or virulence of the pathogenic factors on the other, a knowledge of the theory of the modes of production of the various types of immunity and their kindred types. He is indeed no longer the dental mechanic but, as the degree indicates, the doctor of dentistry and therefore regards the oral cavity only as an essential part of the wonderfully made human machine. The older dentists, graduated before a careful training in pathology and bacteriology were included in the dental course, are returning to the various sources of knowledge

to gain what instruction they may in these most important branches of their profession. One of the first questions asked by the seeker after such knowledge is, "What good textbook can you recommend?" and for his use as well as for the undergraduate it is a pleasure to add to the list of medical textbooks this excellent work by Dr. McFarland.

C. K. B.

THE NOSE, PARANASAL SINUSES, NASOLACRIMAL PASSAGeways, AND OLFACTORY ORGAN IN MAN. By J. PARSONS SCHAEFFER, A.M., M.D., Ph.D., Professor of Anatomy and Director of the Daniel Baugh Institute of Anatomy of the Jefferson Medical College of Philadelphia. With 370 Pages and 204 Illustrations, of which 18 are Printed in Colors. Philadelphia: P. Blakiston's Son and Co., 1920.

This book represents twelve years of original research in the anatomy of the nose and accessory sinuses. Throughout the writer lays stress upon the fact that there is no fixed and unalterable type in very many parts of the human body, and that many normal variations are met with continually. This is true of the nose and paranasal structures. The work begins with an exhaustive developmental study of this region and then takes up in turn the adult anatomy of the nose, the paranasal sinuses, the blood and nerve supply of these parts, and finally the olfactory apparatus proper.

The majority of the illustrations are drawings made from the author's specimens, although a few are photographs.

A perusal of this volume reminds one of Cryer's "Internal Anatomy of the Face," published in 1901, and many of the anatomical findings confirm Cryer's

work. One point of importance, also called attention to by Cryer but not sufficiently realized, is that the nasal floor and palatal arch are not necessarily synchronously wide or narrow. Wide palatal arches may be accompanied by relatively narrow nasal floors and narrow arches by wide floors. Another point is the apparent reduplication of the maxillary sinus in a certain percentage of cases, due to abnormal development of a posterior ethmoid cell into the body of the maxilla.

There is an interesting discussion of the functions of the paranasal sinuses in man. Probably the dominant function of these sinuses is to act as an adjunct to respiration, particularly to aid in warming and moistening the air. Schaeffer also supports a plausible theory that the pneumatization of the bones in the anterior part of the skull has a good deal to do with the poise and equipoise of the head. It is very unlikely that the paranasal sinuses exert any influence on vocal resonance.

The sensory and sympathetic nerve distribution of the parts is dealt with in detail both from the purely anatomical standpoint and also in regard to reflex manifestations. Many hitherto obscure phenomena are explained by tracing out anatomically the paths followed by the nerve impulses. Of special interest in regard to the nerve supply of the teeth and palate is a good description of the sphenopalatine ganglion and its peripheral connections.

While the book is of course of chief interest to the rhinologist, it also has a place as a work of reference in the library of the oral surgeon and dentist.

R. H. I.

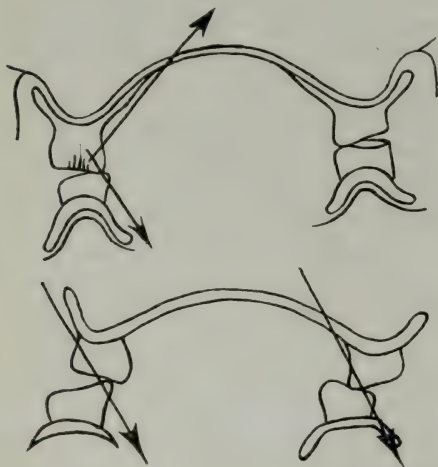
# PRACTICAL HINTS

This Department specially welcomes the brief presentation by our readers of any novel suggestions or methods which in their own practice have proved to be time-saving or to possess other features of advantage.

## Articulation of Artificial Teeth.

By CHARLES KEYES, D.D.S., Rio de Janeiro, Brazil.

At the present time, as well as in the time since Bonwill's methods were introduced, there seems to be considerable unrest in regard to adjusting artificial dentures and perhaps it may not be out of place to present just one more, which



has proved very satisfactory for many years.

When one remembers that in masticating the power exerted ranges from almost nothing to over two hundred pounds, but averaging, perhaps, from twelve to twenty odd; and that the arti-

ficial dentures are only held in place by their adaptation (not being by any means fixtures), and are not always easy to hold in place, even under the most favorable circumstances; it seems well to adapt conditions to circumstances. By making the dentures so that the direction of the force of mastication shall be as much as possible to the center of the arch, and making the contact points under all circumstances small, the results obtained should be that of most efficiency.

By placing the teeth so that they rest, as much as possible, directly over the alveolar ridge, avoiding *any* contact of the six anterior teeth, allowing only the bicusps and first molars to touch; and shaping these so that they only touch on the palatal and lingual edges, and to the extent that there will be a slight triangular space between the teeth with the base of the triangle pointing externally; there results a condition by which, when the jaws are at rest, the dentures are kept in place, and while masticating, the greatest force on the smallest contact points may be exerted and with the tendency always to steady both dentures. Naturally, the shorter the teeth the greater the stability.



## Amalgam Carrier.

By B. E. PLESHETTE, D.D.S., Mount Vernon, N. Y.

It seems to me that the ordinary mouth mirror is more practical as an amalgam carrier than the one suggested by H. L. Staples, D.D.S., in the February issue of the DENTAL COSMOS.

The added advantages of the mirror are increased light reflected to the cavity to be filled, the amalgam is not affected by the glass and the operator can see while he is filling the cavity without

stopping to lay down the special amalgam carrier and then to pick up a mouth mirror to see what has been filled and unfilled. The amalgam may roll off the mirror if one is not careful, but this can be avoided if the lump of amalgam is flattened or held with a suitable amalgam plugger.

3 WEST THIRD ST.

## Apical Infection and Nasal Catarrh.

By L. L. MANN, D.D.S., Bronx, N. Y.

THE following case may be of interest to those of the profession who are placing large silicate restorations over vital pulps in anterior teeth. Patient came to me complaining of soreness over the right lateral incisor, which was filled two years previously with synthetic fillings on both sides. X-ray examination showed a large apical radiolucent area. The tooth was extracted, socket curetted, and the patient reported that on the following morning he could breathe through the right nostril, something he had not done

for about a year and a half, his condition having been diagnosed by many eminent nasal specialists as nasal catarrh. He remarked, however, that the left nostril was still obstructed. The left lateral was thereupon radiographed, and it revealed the same condition as the right one. The same operation was performed as with the right one and patient now reports that his nasal catarrh has disappeared.

272 E. 149TH ST.

## A Correction.

IN the article entitled "An Interpretation of Angle's Classification of Malocclusion," etc., by Dr. Milo Hellman, in our April issue, the first word of the legend under Fig. 7, page 486, should read "Right" instead of "Left." In the same line "*trigonidus*" should read "*trigonodus*." This latter error also occurs in the second line of the second column on page 486 and in the first line of the second column on page 487.

In the last line of the first column on page 488 "protoconid" should read "paraconid," and on page 493, sixth line, second column, the word "*Gymnura*" should read "*Opossum*."—ED.

## REVIEW OF CURRENT DENTAL LITERATURE

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[*Journal of Pathology and Bacteriology*,  
Cambridge, Eng., October 1919.]

### **A Squamous Epithelioma Involving the Frontal and Superior Maxillary Sinuses in a Mare.** BY J. F. D. TUTT.

This case is recorded because of the comparative rarity of this class of tumor in this region in the horse. The growth was removed from a cart mare, twenty years of age, used for farm work. The entire left frontal sinus was completely filled by the tumor. The growth had extended down into the left superior maxillary sinus. The fifth maxillary molar (left) was pushed out of its socket and was carious, and was easily removed by the fingers. Inferiorly the growth was rapidly forcing its way through the nose and underlying palate. Microscopically, the structure was typical of squamous epithelioma of a very cellular character, with numerous cell-nests.

[*Bulletin National Anesthesia Research Society*, January 1920.]

### **Standardizing the Conception of Cardio-Vascular Depressions.** BY CHAS. W. MOOTS AND E. I. MCKESSON.

Speaking before a joint meeting of the American Association of Obstetricians and Gynecologists and the Interstate Association of Anesthetists, at Cincinnati, September 15, 1919, Drs. Charles W. Moots and E. I. McKesson emphasized the fact that cardio-vascular depression being the outstanding symptom of the condition known as shock, it is reasonable to start with the proposition that whatever means enables us to determine the very beginning of this condition is of the greatest importance. These authorities hold that:

"When a cardio-vascular system is reacting normally, an increased pulse rate is accompanied by an increased systolic and diastolic

blood pressure, and *vice versa*. The pulse pressure is roughly half as great as the diastolic pressure and is the most direct evidence we have of the amplitude of the heart contraction, the best evidence of effective blood movement. In normal sleep, the pulse rate and blood pressures are lowered, but their normal relationships are maintained; so are they in an ideal anesthesia.

"But during surgical operations, so many factors enter to disturb the normal reaction of the circulation that we may have many combinations, with almost never a true stimulation, but very frequently a depression of the circulatory system. The changes occur so frequently with sometimes disastrous and sometimes innocent results, that it is most desirable to be able to differentiate between them and to anticipate their onset.

#### BLOOD PRESSURE RULES.

"There is no form of anesthesia, there is no age of patient, there is no type of operation in which one expects to see an elevation of blood pressures during the operation. Our fears are from low blood pressures, rapid pulse rate, and heart fatigue.

"Circulatory depression or decompensation is best divided for surgical operation into three degrees:

"1. *Safe*. 10 to 15 per cent. increase on pulse rate without change in pressure; 10 to 15 per cent. decrease in blood pressures without change in pulse rate.

"2. *Dangerous*. 15 to 25 per cent. increase in pulse rate with 15 to 25 per cent. decrease in blood pressures.

"3. *Fatal*. Progressively increasing pulse rate above 100 with progressively falling blood pressures of 80 or less systolic and 20 or less pulse pressure, for more than twenty minutes.

"The first degree is never fatal but may gradually merge into the second degree. The

second degree, beginning shock, may be regarded as dangerous in the sense that it exhausts the heart and disarms it for defense against continued low blood pressures.

"The third degree is always dangerous to the life of the patient. A vicious circle is established consisting of the low blood pressure, the reduced heart nourishment, which in turn still further reduces the blood pressure, and so on progressively. This usually develops within twenty minutes after the third degree depression occurs and when once well established proves fatal at once or at most within three days. The time in which shock proves fatal depends upon the cardiac muscle reserve and the effectiveness of the treatment employed. Third degree depression may be present in a patient without the usual alarming signs, but after the vicious circle becomes established, evidences of shock become well marked.

#### VALUE OF BLOOD PRESSURE READINGS.

"With the palpating finger, no matter how skilled, one cannot determine all the characteristics of the pulse or the pulse pressures with sufficient accuracy to be of much prognostic value as to the onset and degree of circulatory depression during a surgical operation.

"Blood pressures and pulse determinations every few minutes during all of the more serious operations as well as in many of the so-called minor cases are a part of the duties of every anesthetist. The information regarding the patient's fitness for the operation, his reaction to certain procedures and the immediate prognosis can be gained in no other way with the same degree of accuracy.

"The procedure is made convenient and easy by fastening the blood pressure cuff to the right arm and snugly binding the stethoscope below it with elastic webbing. Readings can then be made at will without disturbing sterile sheets and without losing the continuity of anesthesia.

#### PRESERVING MUSCLE TONE.

"A suitable graphic chart is preferable as a record because the tendencies of the circulation are readily compared from time to time and because the prognosis based upon these tendencies and the character of operative work to follow, can be more accurately made.

"Where nitrous oxid-oxygen was available

in skilled hands the war has corroborated our previous observations that this form of narcosis is one of the best shock prophylactics we have.

"It is not remarkable that nitrous oxid-oxygen should be safer in shock and in preventing shocks than other anesthetics when one recalls the fact that muscle cannot be paralyzed with it.

"The greatest responsibility of the anesthetist is to avoid relative overdosing of the patient in an effort to please the surgeon who may be demanding a flabby musculature.

"The relaxation is not confined to striated muscles of the abdomen and extremities, but extends to the striated muscle of the heart. The effect is at once reflected by the pulse pressure and if pushed too far the diastolic pressure is also decreased, showing the action upon smooth muscle as well.

"The clinical study of blood pressure has convinced us that the final factor in shock is muscular exhaustion or an interference with muscular action. One thing is most apparent, the average patient having been profoundly anesthetized for extreme relaxation is half shocked, a second degree depression, and it often takes but little trauma to complete the picture of third degree depression."

In this connection it is interesting to report that all the members of the Toledo Society of Anesthetists have adopted this standardized conception of cardio-vascular depression and are using it graphically on their charts. Their records when compiled should develop some valuable and original information.

[*Lancet*, London, Feb. 7, 1920, pp. 303, 324.]

#### Dental Sepsis in Children: Its Consequences and Treatment. By F. ST. J. STEADMAN.

Steadman has in mind the child who is presented with advanced dental caries in one or many teeth, and the treatment of this condition and its sequelæ from a broad national point of view.

The results of dental sepsis to which Steadman calls attention are (1) a state of general malnutrition, in which the patient is anemic, under weight, and defective in mental acumen; (2) gastro-intestinal disorders (gastric and abdominal pain, diarrhea of an offensive character, anorexia); (3) infection of adja-



cent parts by continuity of tissue, *e.g.*, pharyngitis, tonsillitis, otitis media, meningitis, involvement of the submaxillary and cervical lymphatics.

Approximately 7000 to 8000 children have been treated in the way about to be described. Of these a considerable percentage have shown marked improvement in their general health, and in no case has the health been adversely affected by the removal of their septic teeth.

All deciduous teeth in which the pulp has become infected are extracted, and generally their antagonists also. Teeth are only filled when Steadman feels sure that the pulp is not affected. The permanent molars are treated in the same way, if the roots are incomplete at the time of the pulpal infection.

Steadman has found no serious loss in mastication, after extensive extraction. He presents answers to the objections against extensive extraction, such as the loss in mastication, interference with the development of the jaws and the permanent molars.

When extensive extraction has been decided upon, it should be carried out at one time under one general anesthesia, as ethyl chlorid.

[*Journal of the American Medical Association*, January 3, 1920.]

#### **Cultural Studies on a Case of Sprue** (Preliminary Note). BY WADE W. OLIVER.

From this case a yeast was recovered which corresponds in the main to *Monilia* of Ashford (*M. psiolosis*, *American Journal of Medical Sciences*, August 1917, pp. 154-157). The organism was isolated on +1 glucose agar plates from stool, tongue, sputum, and tooth abscess. Intraperitoneal injection of a guinea-pig killed the animal in seven days, and from the liver and the gall-bladder, the yeast was recovered, mixed with *Micrococcus aureus*.

Cultures from the tongue were taken in one case by scraping the inflamed surface with a sterile knife, after preliminary swabbing of the tongue with sterile water, and in the other instance by thoroughly swabbing the tongue with a sterile cotton swab. The culture was obtained from the tooth abscess by inserting into the latter a small sterile pledget of cotton mounted on a sterile stick and immediately streaking several large plates of +1 glucose agar.

A difference was noted between the stool

and the tongue strains in respect to fermentation tests. The tongue strain produced both acid and gas in saccharose, whereas the stool strain split off acid alone from this disaccharid.

[*Medical Record*, New York City, April 10, 1920.]

#### **Differential Diagnosis between the Pains of Tabes Dorsalis and Those of Focal Infection.** BY ALBERT M. CRANCE.

This is the report of a case previously treated, intensively for nine years, unsuccessfully for syphilis, with complete relief of symptoms following extraction of abscessed teeth. The patient was a man of forty years. No admitted history of syphilis, and several Wassermann tests negative. The physical findings were very suggestive of tabes dorsalis, including the "rope sensation" around the waist, and yet no sign was at all positive.

Pyorrhea alveolaris of moderate severity. Roentgenograms showed apical rarefaction around left maxillary first and second incisors, and first premolar, and around maxillary right first incisor, and left mandibular second molar. Tonsils moderate in size. Slight chronic pharyngitis; submaxillary lymph nodes prominent on both sides.

The teeth showing rarefactions of periodontal tissues were extracted and the "pyorrhea" was treated.

Within three weeks, complete relief of pains he had had for past nine years. The "rope sensation" around the waist disappeared entirely.

[*Minnesota Medicine*, April 1920, III, pp. 169-173.]

#### **Palliative Treatment vs. the Radical Treatment of Trifacial Neuralgia.** BY A. W. ADSON.

Eight hundred and five alcohol injections have been administered at the Mayo Clinic in a series of 318 patients in addition to 203 other palliative operations (drainage of antrum, dental extractions, nasal operations, maxillary operations, nerve avulsions), making a total of 1008 palliative surgical treatments. Ninety patients have had radical operation with complete relief, the remaining 228 are still seeking relief by temporary measures. Only four patients died.

# PERISCOPE

**Dentists Registration in England.**—*The Dentists Register* for 1920, issued by the General Medical Council (3s. 4d., Constable & Co., Ltd., London), contains 5455 names, a decrease of 112 on the previous year's figures and the lowest number since 1916. The names added by registration since the last issue of the *Register* number 128—practically the same as in the two preceding years, but considerably below the average for 1914 to 1919 inclusive. The percentage of persons registered as being in bona-fide dental practice at the passing of the Dentists Act, 1878, is 18.89; last year it was 22.36.—*The Chemist and Druggist*, April 24, 1920.

**Handling Soft Ridges in Denture Work.**—When we are called upon to deal with an extremely soft ridge, *i.e.*, one that is movable and flabby, I firmly believe that a surgical removal of this tissue is indicated, because a better fitting and more stable denture can be constructed on a flat firm jaw than on a jaw with a yielding support. A denture can be constructed on a soft ridge jaw that resists dislodgment, but it will not possess the same degree of efficiency that a denture would have with a solid base.

Patients are not always willing to have this soft tissue removed surgically, and so we are called upon to employ such technique as will produce the best results under existing conditions.—GEORGE P. BRENNER, *Journ. of the N. D. A.*

**The Cast Clasp.**—The relative strength of the cast clasp as compared to those made from rolled or drawn metals must be kept in mind, and it must be remembered that the cast clasp is more brittle and rigid, so therefore must be made heavier, and does not possess the great amount of spring that is found in the rolled or drawn clasp. However, the accuracy with which a cast clasp can be fitted to a tooth compared to the former methods is greatly in favor of the cast clasp, and it can be made of sufficient strength to withstand all the stress of mastication. Another advantage of the cast clasp is that it fits the tooth so accurately that if it is made to have the proper reciprocal bearing there is no

chance for the tooth to tip in the clasp, or to become displaced as a result of masticating stress.—F. E. ROACH, *Journ. of the N. D. A.*

**Preserving Extracted Teeth.**—(1) Clean teeth thoroughly.

(2) Bleach teeth with pyrozone three per cent. in glass covered jar, leaving them exposed to sunlight until sufficiently bleached.

(3) After removal from jar, dry, and place in a solution of one part formaldehyd, two parts glycerin, and three parts grain alcohol. Expose teeth in the solution to sunlight for several days.

(4) Remove teeth, dry thoroughly, and immerse in a supersaturated solution of Xyol (Xyolene) with high-fusing paraffin of not less than 130° F. Xyol is very volatile, and explodes when coming in contact with a flame. It must be heated in warm water and the paraffin added in small particles. The teeth must remain in the paraffin while in a liquid state, for several hours; then remove them and wipe with a dry cloth. If the teeth require a polished surface, then use a fine grade of Tripoli on a cloth wheel, with lathe running at high speed. Care must be taken, however, not to overheat a tooth while it is being polished.—R. H. RONEBERGER, *Dental Digest*.

**Plasticity of Amalgam.**—In all average large and proximo-occlusal cavities the amalgam mass must be extremely plastic during the filling of the first two-thirds of the cavity to insure adaptation in the use of high-grade alloys.

This important requirement is best accomplished by retaining sufficient of the excess mercury (commonly removed during the final mixing or kneading) to be removed after it has served its purpose, by thorough, forceful, and orderly packing.

The excess mercury generally removed during the final mixing is not dangerous to the stability of the filling, because this mercury is a surplus always removed by very ordinary packing force.

The excess mercury that requires our special attention is the final excess: the com-



plete removal of this dangerous excess is absolutely and solely dependent upon thorough, forceful, and orderly condensation.

Decided plasticity and the importance of uniform condensation are two operative details, not previously recognized by the profession as essential to results, that must be accepted if we would make, with reasonable uniformity, non-leaking and stable amalgam fillings.

The question of strength and stability in our amalgam fillings is not governed by the percentage of mercury in the finished filling; the danger lies in our failure to remove that mercury not amalgamated by a thorough, forceful, and orderly condensation. The operator cannot guard against this danger by using less mercury for the mix, or by trying to express the excess during the final mixing or kneading, because this excess mercury only becomes apparent under thorough manipulation and packing, the one opportunity to remove it completely, by the use of a proper technique at the proper time.—WM. E. HARPER, *Journ. of the N. D. A.*

**Cementing on a Bridge.**—After the utmost care and painstaking in constructing a bridge, one may fail at the last moment in what seems a simple matter—that of cementing it properly on the piers.

Dr. Richmond, the inventor of the shell crown, instructed dentists to drill a small hole in the crown, at a point convenient for filling with foil, after setting the same. This allows the cement to escape, and allows us to force the crown to place. This precaution seems to be wholly neglected today. I believe it always should be observed, especially in cases where the tooth or teeth crowned be trimmed only to a cylindrical shape. Even in cases where the crown has been trimmed to a point, it acts as a piston within the encircling shell of gold, compressing the cement, and causing it to act as a buffer, preventing the crown from going to place. This may happen even though the cement be mixed quite thin, almost of a creamy consistence.

Since returning to Dr. Richmond's early instructions, I have had little difficulty in setting bridges; have been spared much after-grinding.—FRANK W. SAGE, *Dental Summary*.

**Extension for Prevention.**—The outline form comprehends the doctrine of extension for prevention and the esthetic form.

Extension for prevention is that form that is given to the outline of a cavity that will bring the margins of the finished filling into the areas of relative immunity to decay.

We know that there are certain areas of the tooth surface that are not as susceptible to the beginnings of decay as are other parts, and it is the part of wisdom and good operative ability to so arrange our cavity that the finished filling will cause the tooth to present less vulnerable points for the ravages of decay than it did at the beginning of the operation, for if we do not change the condition that called the first decay into being, what assurance have we that there will not be a recurrence of decay sooner or later?

In making our outline form, then, to conform with the doctrine of extension for prevention, we must cut our cavity buccally and lingually so far that the margin will be far enough out of the embrasures that the margin of the finished filling will be perfectly clear of approximating tooth or of filling in the tooth. It must be so far out that it will be self-cleansing, that is, that the bolus of food as it travels down the tooth as it is crushed in the act of mastication, will scour the margin of the filling from occlusal to gingival. It is at the gingival angle that the most care should be taken, for here is the point of greatest vulnerability, and here more than anywhere else is there a recurrence of decay. The older operators insist that this is because there is not the perfect adaptation of the filling here as there is at other points, owing to the difficulty of manipulation, and while that is true to some extent, the fact remains that fillings that are so made that the angles at the gingival margin are brought well into territory that is kept clean do not decay in a degree at all comparable to those that are not so made. It is important, then, that the lines of the cavity buccally and lingually should be brought well out of the embrasures from the occlusal margin down to the gingival angle. The gingival margin should be carried well under the free margin of the gum, for we know that the tooth does not decay under healthy gum tissue. It is well to bear in mind the last part of that sentence—under healthy gum tissue—and be sure that we leave the gum in a healthy condition, for a great deal of harm is done by careless or ignorant operators in mutilating the delicate septal tissue either in the making of a cavity or in the polishing of the filling, or what is worse, leaving a rough gingival margin to the filling or leaving a bad overhang which will serve as a continual source of irritation, which will set up an inflammation, and will cause a congested condition of the gum or will cause it to recede, leaving a vulnerable area for a future recurrence of decay.—J. V. CONZETT, *Journ. of the N. D. A.*



# OBITUARY

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## Dr. Thomas L. Westerfield.

DIED, at his home in Dallas, Tex., after a brief illness, on the twenty-ninth day of April 1920, THOMAS L. WESTERFIELD, D.D.S.

Dr. Westerfield was born in Glasgow, Ky., and received his early education at Louisville. As a very young man he began the study of dentistry under a preceptor and later entered the Dental Department of the University of Tennessee at Nashville, from which institution he received the degree of Doctor of Dental Surgery in 1883. Immediately after his graduation he began the practice of his profession at Jefferson, Tex., and in 1887 removed to Dallas, where he continued in practice until the time of his death.

Dr. Westerfield was a constant attendant upon the meetings of the State Dental Society and was deeply interested in and worked unceasingly for the upbuilding of his profession. He was one of the founders of the Dallas Dental Society and was its first president. He became a member of the Texas Dental Association in 1888, serving as its president during the year of 1897, and in recognition of his services to the profession, he was made a "good fellow" of the State Society in 1913. He was a member of the American Dental Association (later the National); a member of the Southern Dental Association (later the Southern branch of the National), and a member of the Texas State Board of Dental Examiners for a number of years.

Dr. Westerfield was a professional man of the highest type, a friend of his fellowmen, and a lover of children. He was also an intense lover of nature and of all of God's creatures, and was never quite so happy as when roaming through the woods and fields with his wife or congenial friends.

His remains were interred in the city cemetery at Dallas, Tex.

## Dr. William E. Dunn.

DIED, November 13, 1919, at his home in Brooklyn, N. Y., in his sixty-first year, WILLIAM EDWIN DUNN, D.D.S.

Dr. Dunn was born in Delaware, Ohio, in 1858. Before locating in Brooklyn, Dr. Dunn practiced dentistry for many years in Chicago. He was the son of the late William E. Dunn and was associated with his father in developing the continuous gum process for artificial dentures.

Dr. Dunn is survived by his wife, Mary (Ford) Dunn. His remains were interred in Woodlawn Cemetery, Brooklyn, N. Y.

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## Dr. George E. Adams.

DIED, Thursday, February 19, 1920, at his home, South Orange, N. J., from pneumonia, GEORGE EMORY ADAMS, D.D.S.

Dr. Adams was born in Lowell, Mass., in 1849, the son of the late Mr. and Mrs. Emory H. Adams. In 1870 Dr. Adams' parents moved to South Orange, N. J., where Dr. Adams completed his literary education. He entered the Baltimore College of Dental Surgery in 1886 and received the degree of Doctor of Dental Surgery from that institution in 1888. Immediately after his graduation he began the practice of his profession in South Orange, where he continued to practice until the time of his death.

Dr. Adams was actively interested in all phases of dentistry and was a charter member of the Central Dental Association of New Jersey, a member and one time president of the New Jersey State Dental Society, and a member of the National Dental Association. He was also for ten years a member and president of the New Jersey State Board of Dental Examiners.

Dr. Adams is survived by his wife and son

and a sister. His remains were interred in Mendham Cemetery on Sunday, February 22, 1920.

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### **Dr. Troy A. Apple.**

DIED, January 31, 1920, from influenza-pneumonia, at his home in Winston-Salem, N. C., in his thirty-seventh year, TROY ARTHUR APPLE, D.D.S.

Dr. Apple was born November 3, 1883, in Madison, N. C., the son of J. M. and Ella Apple. He obtained his early education in the grammar schools and high school of Madison. In 1903 he entered the dental school of the University of Maryland and in 1907 graduated with honors from that institution.

Soon after his graduation from the University of Maryland Dental School, Dr. Apple associated himself in practice with his brother at Winston-Salem, where he conducted a successful practice until the time of his death. Dr. Apple was a member of the North Carolina State Dental Society, the National Dental Association, the Psi Omega Dental Fraternity, the Masonic Blue Lodge, and the Benevolent and Protective Order of Elks.

Despite the fact that he was young in years, Dr. Apple had become an influential factor in the civic, religious and social life of Winston-Salem, and his death brings sorrow to his many friends and acquaintances.

Dr. Apple was married in 1908 to Miss Grace Pratt of Madison, N. C., who, with one son, survives him.

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## **DENTAL COLLEGE COMMENCEMENTS**

### **University of West Tennessee, Dental Department.**

THE commencement exercises of the Dental Department of the University of West Tennessee, were held in the College Hall, Memphis, Monday, May 10, 1920.

The address was delivered by E. Clippinger, A.M., LL.D., principal of LeMoyné Institute.

The degree of Doctor of Dental Surgery was conferred by M. V. Lynk, M.S., M.D., LL.B., president, on the following graduates:

Aurelius Jefferson  
Hezekiah Milloy

Augustus Rivers  
Eugene Sims

Jessie Warr  
Warren Waters

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# ARMY AND NAVY DENTAL NEWS

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## Assignments.

### Navy Dental Corps.

*Week ending March 6th.*

Lieut. Edward B. Howell (class 2), detached from navy yard, Mare Island, Calif.; to U. S. S. Chicago.

*Week ending March 13th.*

Lieut.-Commander James L. Brown, detached from navy yard, Mare Island; to U. S. S. Comfort.

Lieut. Joseph A. Tartre, detached from U. S. S. Comfort; to navy yard, Mare Island, Calif.

*Week ending March 20th.*

Lieut.-Commander Eugene H. Tennent, detached from naval training station, Hampton Roads, Va.; to duty at naval station, Guantanamo Bay, Cuba.

Lieut.-Commander Frank S. Tichy, detached from naval station, Guantanamo Bay, Cuba; to home and await orders.

*Week ending March 27th.*

Lieut.-Commander Albert Knox, detached from naval training station, San Francisco, Calif.; to Naval Academy, Annapolis, Md.

Lieut. Charles L. Tompkins, detached from navy yard, Puget Sound, Wash.; to naval training station, San Francisco, Calif.

Lieut. Patrick A. McCole (class 2) (29), detached from Naval Academy, Annapolis, Md.; to marine expeditionary force, Santo Domingo.

*Week ending April 10th.*

Lieut. Errol W. Willet, detached from U. S. S. Buffalo; to navy yard, Mare Island, Calif.

*Week ending April 17th.*

Lieut. Joseph P. Copp, detached from U. S. S. Chicago; to duty at naval station, Pearl Harbor, T. H.

Lieut. Clarence E. Garcia, detached from navy yard, Mare Island, Calif.; to U. S. S. Charleston.

*Week ending May 8th.*

Lieut.-Commander Thomas L. Sampsell, detached from naval training station, naval

operating base, Hampton Roads; to duty Nevada.

Lieut. Daniel A. Doherty, detached from receiving ship at Boston, Mass.; to Black Hawk.

Lieut.-Commander Leon Martin, detached from Naval Academy, Annapolis; to duty in fifteenth naval district.

Lieut. Edmund Laughlin, detached from Georgia; to naval training station, Great Lakes.

Lieut. James F. McGrath, detached from Virginia; to naval training station, Newport.

Lieut. John A. Waters, detached from New Jersey; to naval training station, Hampton Roads, Va.

Lieut. Chester H. Webber, detached from Nebraska; to duty at navy yard, Mare Island, Calif.

Lieut. Charles R. Wells, detached from navy yard, Charleston, S. C.; to duty at naval station, Guam.

### Army Dental Corps.

*Week ending March 20th.*

1st-Lieuts. Godfrey W. Henske and William C. Holland, honorably discharged.

*Week ending March 27th.*

Maj. Arthur J. Hart, to Charleston, S. C., and report to retiring board for examination.

1st-Lieut. Walter D. Love to Omaha, Nebr., army balloon school, for duty.

1st-Lieut. Raymond S. George to Fort Riley, Kans., for duty.

*Week ending April 10th.*

Col. Frank H. Wolven report to retiring board at San Francisco for examination.

Lieut.-Col. Thomas L. Smith is honorably discharged as lieutenant-colonel only.

Major J. Craig King, having been found by an Army retiring board incapacitated for active service on account of physical disability incident thereto, his retirement from active service is announced; proceed home.

Resignations by Capt. Neil J. McCollum, 1st-Lieuts. Harold A. Curtis, James A. Curtis, Jr., accepted.

Cpts. Benjamin C. Coombe, Robert W.



Parrish, 1st-Lieut. Lerel M. Bowman, honorably discharged.

*Week ending April 17th.*

1st-Lieut. Richard S. Payne to Edgewood Arsenal, Md., for duty.

1st-Lieuts. Albin P. Dansereau and Karl E. Osborn honorably discharged.

*Week ending April 24th.*

Col. George L. Mason to Camp Dix, N. J., for duty.

Col. Frank H. Wolven report to retiring board at Washington for examination.

Maj. Lee S. Fountain and Capt. James B. Mann to Walter Reed General Hospital, D. C., for duty.

Capt. Roy R. Newman report by wire to commanding general, Central Department, for assignment.

Capt. Arthur T. Burchill report by wire to commanding general, southeastern department for assignment.

Capt. Ralph O. Leonard honorably discharged.

1st-Lieut. Wm. E. Sankey to Camp Pike, Ark., for duty.

1st-Lieut. Harold S. Whitney to Fox Hills, N. Y., General Hospital 41 for duty.

*Week ending May 1st.*

Col. Frank H. Wolven, report to retiring board, Washington, for examination.

Maj. William S. Rice to Chicago, and report to commanding general Central Department for duty.

Maj. Frederick R. Wunderlich to Camp Zachary Taylor, Ky., for duty.

Maj. Thomas C. Daniels to Presidio of San Francisco for duty.

Capt. Hooker O. Lindsey to attending surgeon's office, Washington, for duty.

Capt. Edwin M. Kennedy to Fort Logan, Colo., for duty.

1st-Lieut. Melville A. Sanderson to Fort Andrew, Mass., for duty.

1st-Lieut. Edward L. Dillon, honorably discharged.

*Week ending May 8th.*

Maj. William Mann to San Francisco and about June 5th to Hawaiian Department for duty.

Capt. Adrian C. Ragan to San Francisco, and about June 5th to Hawaiian Department for duty.

Capt. William J. Eggleton, 1st-Lieuts. Leon A. Jones, James S. Dailey, and Albert W. Harrison, honorably discharged.

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## SOCIETY NOTES AND ANNOUNCEMENTS

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NOTICES should reach the Office of the DENTAL COSMOS *not later* than the 11th or 12th of the month preceding that of publication.

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### Coming Dental Society Meetings.

#### National Meetings.

CANADIAN DENTAL ASSOCIATION. Ottawa, Ont. August 17th to 20th.

NATIONAL DENTAL ASSOCIATION. Boston, Mass. August 23d to 27th.

#### State Meetings.

##### JUNE.

FLORIDA STATE DENTAL SOCIETY. Miami. June 15th to 17th.

MAINE DENTAL SOCIETY. Old Orchard. June 23d to 25th.

SOUTH CAROLINA STATE DENTAL ASSOCIATION. Columbia. June 15th to 17th.

SOUTHERN CALIFORNIA DENTAL SOCIETY. Los Angeles. June 28th to 30th.

VIRGINIA STATE DENTAL ASSOCIATION. Lynchburg. June 30th to July 3d.

##### JULY.

NEW JERSEY STATE DENTAL SOCIETY. Atlantic City. July 14th to 16th.

PSI OMEGA FRATERNITY (OHIO ALUMNI CHAPTER). Cedar Point. July 12th to 14th.

WISCONSIN STATE DENTAL SOCIETY. Milwaukee. July 13th to 15th.

**Examiners' Meetings.**

ALABAMA BOARD OF EXAMINERS. Birmingham. June 21st.

ARKANSAS BOARD OF EXAMINERS. Little Rock. July 5th to 7th.

CALIFORNIA BOARD OF EXAMINERS. San Francisco. June 21st.

COLORADO BOARD OF EXAMINERS. Denver. June 1st.

CONNECTICUT DENTAL COMMISSION. Hartford. June 17th to 19th.

DELAWARE BOARD OF EXAMINERS. Wilmington. July 14th and 15th.

DISTRICT OF COLUMBIA BOARD OF EXAMINERS. Washington. June 21st to 24th.

FLORIDA BOARD OF EXAMINERS. Miami. June 11th.

GEORGIA BOARD OF EXAMINERS. Atlanta. June 7th.

IDAHO BOARD OF EXAMINERS. Boise. July 13th to 16th.

ILLINOIS DEPARTMENT OF REGISTRATION. Chicago. June 21st to 26th.

IOWA BOARD OF EXAMINERS. Iowa City. June 7th.

MAINE BOARD OF EXAMINERS. Augusta. July 7th to 9th.

MARYLAND BOARD OF EXAMINERS. Baltimore. June 9th and 10th.

MASSACHUSETTS BOARD OF EXAMINERS. Boston. June 14th to 18th.

MICHIGAN BOARD OF EXAMINERS. Ann Arbor. June 14th to 19th.

MISSISSIPPI BOARD OF EXAMINERS. Jackson. June 15th.

MONTANA BOARD OF EXAMINERS. Helena. July 12th.

NEBRASKA BOARD OF EXAMINERS. Omaha. June 8th and 9th. Lincoln, June 8th to 12th.

NEW HAMPSHIRE BOARD OF EXAMINERS. Manchester. June 30th, July 1st and 2d.

NEW JERSEY BOARD OF REGISTRATION. Trenton. June 28th to July 2d.

NORTH CAROLINA BOARD OF EXAMINERS. Wrightsville Beach. June 19th.

OKLAHOMA BOARD OF EXAMINERS. Oklahoma City. June 7th to 12th.

PENNSYLVANIA BOARD OF EXAMINERS. Philadelphia and Pittsburgh. June 23d to 26th.

RHODE ISLAND BOARD OF REGISTRATION. Providence. June 29th to July 1st.

SOUTH DAKOTA BOARD OF EXAMINERS. Sioux Falls. June 23d to 26th.

TENNESSEE BOARD OF EXAMINERS. Memphis. June 10th.

VERMONT BOARD OF EXAMINERS. Montpelier. June 28th to 30th.

VIRGINIA BOARD OF EXAMINERS. Richmond. June 8th.

WISCONSIN BOARD OF EXAMINERS. Milwaukee. June 21st.

WYOMING BOARD OF EXAMINERS. Cheyenne. June 28th to 30th.

**Florida State Dental Society.**

THE annual meeting of the Florida State Dental Society will be held at Miami, Fla., on June 15, 16, and 17, 1920.

H. B. PATTISHALL, *Sec'y*,  
Jacksonville, Fla.

**Maine Dental Society.**

THE annual meeting of the Maine Dental Society will be held at Old Orchard, Me., on June 23, 24, and 25, 1920.

B. C. GRAFFAM, *Sec'y*,  
Portland, Me.

**South Carolina State Dental Association.**

THE next annual meeting of the South Carolina State Dental Association will be held in Columbia, S. C., at the Jefferson Hotel, June 15th to 17th.

ERNEST C. DYE, *Sec'y*.

**National Anesthesia Research Committee.**

THE annual convention of the National Anesthesia Research Committee will be held in Pittsburgh, Pa., the week of October 4th, in conjunction with that of the Inter-State Anesthetists' Association and the Pennsylvania Medical Society. Prizes aggregating \$200 are offered by the society for the best papers on original research in anesthesia, such papers to be read at the annual meeting. This offer is open to all surgical, medical, and dental students and practitioners in the United States.

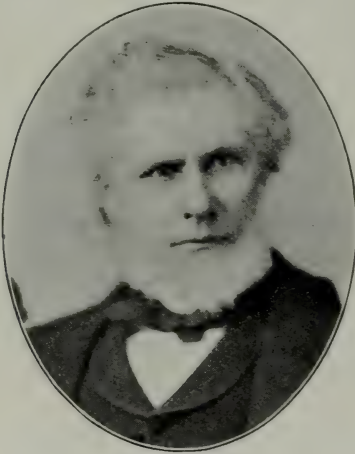
F. H. McMECHAN, M.D., *Chairman*,  
Avon Lake, Ohio.

# National Dental Association Meeting.

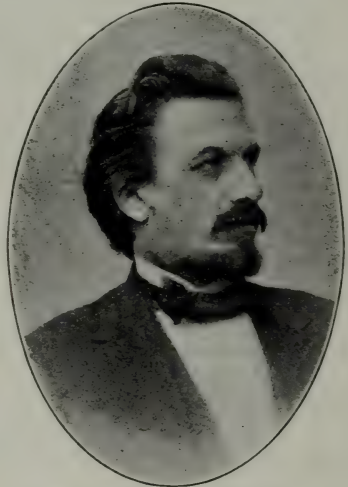
BOSTON, MASS., August 23, 24, 25, 26, 27, 1920.

THE National Dental Association will hold its annual meeting this year in Boston, and

and brotherly feeling among dentists one of them asked the other, "Will you be one of six



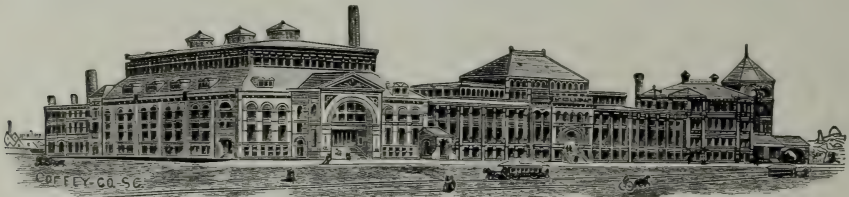
DR. SAMUEL J. MCDUGALL.



DR. DANIEL G. HARRINGTON.

will be the guests of the Old Bay State. The preparation for the meeting is in charge of a local committee of the Massachusetts State

to form a dental society in Massachusetts?" The other assenting called on Drs. Chandler,



MECHANICS BUILDING.

Dental Society. It may be of interest to some of our guests to know something of the formation and history of the Massachusetts Dental Society.

In February 1864 Dr. Samuel J. McDougall and Dr. Daniel Grout Harrington accidentally met in the S. S. White Depot and while conversing on the subject of lack of co-operation

Ham, Harriman, M. W. Pray, E. N. Harris and others to the number of twelve, who later met and organized the Massachusetts State Dental Society. Thus Drs. McDougall and Harrington were the original founders of the Society.

The National Dental Association this year is planning a Seminar Course Meeting which will comprise a Postgraduate Course in every



phase of dentistry. The meeting will be held in the Mechanics Building, which is one of the largest buildings in the United States for

convention city, Greater Boston furnishes much of historical interest, and it would be well for the visiting members of the associa-

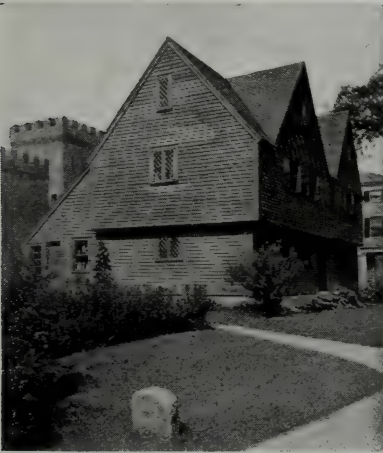


CUSTOM HOUSE, BUILT IN 1819. (Where Hawthorne wrote "The Scarlet Letter.")

exhibition purposes of any description, being 600 feet in length, covering three acres of land, and containing 150,000 square feet of floor space. The committee in charge of the

tion to plan a few extra days for sight-seeing purposes. At the information booth in the Meeting Hall booklets and information relative to historic points of interest may be obtained.

Among the points of interest in the City of Boston, are Beacon Hill, Boston Common,



JOHN WARD HOUSE, SALEM, MASS.

exhibits promises the biggest and best dental exhibit ever gathered together under one roof in this or any other country.

Besides being especially attractive as a



LOWELL HOUSE, BOSTON.

Old South Church, Boston Public Library, State House, Boston Court House, Boston Museum of Fine Arts, Trinity Church, Natural History Museum, Paul Revere House, Old State House, Bunker Hill Monument, First Meeting House, Old North Church, John Han-

cock House, Old Corner Book Store, Site of Boston Massacre and Boston Tea Party, Forsyth Infirmary, Largest Drydock in the World, and many others.

Greater Boston also furnishes many enjoyable trips, especially those to Concord and Lexington and the north and south shores.

Along the north shore, sixteen miles from Boston is Salem, Mass., which, with its many historic points, is well worth one day of your visit. Here may be seen the Witch House, The House of the Seven Gables, Hawthorne's Birthplace, The Essex Institute, The Court House Witch Pins, Peabody Museum and others.

A trip to the south shore is delightful and interesting, passing through many old and

beautiful towns, such as Hingham, Cohasset, Scituate, Mansfield, Kingston and Plymouth.

Make your plans early, as this meeting will be the largest in point of attendance of any National Dental Association meeting. The question of hotel reservations is one of the most difficult problems of the local committee and they advise members who expect to attend to communicate at once with the

**Committee on Hotel Accommodations,  
National Dental Association,  
419 Boylston St., Boston, Mass.**

Do not forget the dates—August 23, 24, 25, 26, 27, 1920.

F. E. JEFFREY, D.M.D.,  
*Chairman Pub. Com.*

## HOTEL RESERVATIONS

FOR THE

## National Dental Association Convention.

ON the following pages will be found a list of hotels, types and prices of rooms.

Read instructions, and to avoid unnecessary delay, mail application *at once*.

The Committee will endeavor to make reservations as requested, and will send a card, signed by the hotel, confirming completed reservation.

Do not write to hotels, as arrangements

have been made to make all reservations through the Committee.

There will be no Headquarters hotel. Headquarters will be in the Mechanics' Building, the place of meeting.

Reservations will be made in the order in which applications are received.

With the co-operation of everyone the Committee will be able to secure accommodations for all members attending the Convention.

### INSTRUCTIONS.

Select type of accommodations desired. (See Types of Hotel Reservations below.)

Send your Application for Hotel Reservation. Be sure to mention type, price, three

choices of hotels; if you will share room or suite with others, time of arrival.

Sign Application, giving name and address in full, and mail *at once*.

### TYPES OF HOTEL RESERVATIONS.

#### Type A.

Suite of Parlor and 2 Bedrooms, for 4 persons, private bath for the suite, 2 single beds in 1 room, double bed in other room.

#### Type C.

Suite of Parlor and Bedroom, for 2 persons, private bath, 2 single beds.

#### Type B.

Suite of 2 Bedrooms, for 4 persons, bathroom between bedrooms, 1 room with 2 single beds, other room with double bed.

#### Type D.

Double (outside) Bedroom, for 2 persons, private bath, 2 single beds.

**Type E.**

Double (outside) Bedroom, for 2 persons, private bath, 1 double bed.

**Type G.**

Single (outside) Bedroom, for 1 person, private bath, single bed.

**Type J.**

Single Bedroom, for 1 person, without attached bath, single bed.

**Type F.**

Double (inside) Bedroom, for 2 persons, private bath, 1 double bed.

**Type H.**

Single (inside) Bedroom, for 1 person, private bath, single bed.

**Type K.**

Double Bedroom, for 2 persons, without attached bath, double bed.

*Note.* The word "inside" indicates accommodations are located on courts. Variations from the usual types of suites and rooms are explained in notes at the bottom of the list of hotels. To secure the best accommodations members are advised to club together and use the many desirable suites listed.

IN ALL CASES THE FIGURES INDICATE THE PRICE PER DAY FOR EACH SUITE OR ROOM.

HOTELS	A	B	C	D	E	F	G	H	J	K
Adams House		\$9.50 Note 1 Note 5	\$8.00			\$3.50			\$2.00 2.50	
Arlington		6.00 6.50 Note 5	6.00 Note 5	\$4.00 5.00	\$3.50 4.00		\$3.00 3.50			
Avery		12.00		7.00	6.00					
Brewster		10.00 Note 5		4.50	4.00		2.50		2.00	\$3.00
Buckminster	\$15.00 Note 2	10.00 Note 2	9.00	7.00					2.50	4.00 Note 2
Colonial		6.00 Note 5	5.00 Note 5		3.00 3.50				1.50	2.00
Commonwealth		8.00 Note 5			4.50 5.00 6.00		3.00 4.00		2.50 3.50	3.50 4.50
Essex					7.00	7.00	4.00	4.00	3.00	5.00
Langham	7.00	7.00 Note 5	4.50 Note 5		3.50				1.50	2.50
New American House			10.00	5.00	5.00					3.00 4.00 Note 3
Parker House	17.00 Note 4		12.00 Note 5	7.00	5.50 6.50 7.00		3.50 4.50 5.00		2.50 3.00 3.50	3.50 4.00 4.50
Putnam									1.00 1.50 2.00 3.00	2.00 3.00
Quincy House					7.00	6.00			3.00	4.00
Young's				7.00	6.50		4.50			4.00

*Explanatory Notes.* 1. Bathroom not between bedrooms, suitable for men only. 2. Has all single beds, no double beds. 3. Same type for 4 persons, \$6. 4. Same type with 2 baths, \$18.50. 5. Has all double beds, no single beds.



## National Dental Golf Association.

THE National Dental Golf Association was organized at New Orleans last October, and temporary officers elected.

The first tournament will be held in Boston on the Woodlawn Golf Course, Monday, August 23, 1920, during the meeting of the National Dental Association.

It is purposed to effect a permanent organization at that time. Officers will be elected, committees appointed, and suitable by-laws adopted.

It is desired that all members of the National Dental Association, interested in golf, should become affiliated. An effort is being made to supply such persons with application blanks. There is an application blank at the end of Chick Evans' article on "Why Professional Men Should Play Golf," published in the April issue of the *Journal of the National Dental Association*. Blanks may also be secured from the Secretary-Treasurer.

You should join the association whether you expect to attend the Boston meeting or not. The admission fee is \$3.00, paid but once, and no other fees will be charged except to those who participate in the tournaments.

The following events have been suggested for the Boston meeting:

36-Hole Medal Play for Association Championship.

36-Hole Handicap Medal Play.

36-Hole Against Par.

36-Hole Handicap Against Par.

Best Ball Twosome for 36 Holes (less  $\frac{1}{2}$  total handicap).

Best Ball Foursome for 36 Holes.

15-Hole Handicap Medal Play (morning).

18-Hole Handicap Against Par (afternoon).

Low Net Medal Score for Best 9 Holes (morning).

Low Medal Score for Best 9 Holes (afternoon).

While it is the intention of the Association to conduct an annual tournament at the time and place of the National Dental Association meeting, it is not proposed that it shall in any way interfere with the scientific program.

Any further information will be gladly furnished upon request.

F. M. CASTO, *Chairman*,

Rose Bldg., Cleveland, O.

RALSTON I. LEWIS, *Sec'y-Treas.*,

25 E. Washington st., Chicago, Ill.

## Dental Alumni Society, University of Pennsylvania.

### Fortieth Anniversary.

#### BUSINESS MEETING.

THE annual meeting of the Dental Alumni Society, University of Pennsylvania, will be held in the lecture room of the Thomas W. Evans Museum and Dental Institute, Fortieth and Spruce sts., Philadelphia, on Friday, June 11, 1920, at 10 A.M.

#### CLINICS.

The Clinic Committee has prepared a series of progressive clinics to be held in the afternoon of the same day from 2 to 5 o'clock. Each clinician will be allowed thirty minutes in which to present his subject.

Dr. J. Kendall Burgess—Pin Inlay Work.

Dr. H. J. Kauffer—Mouth Diagnosis.

Dr. Hermann Prinz—Technique of Using Dichloramin-T in Root-canal Work.

Dr. Edwin Shoemaker—Cast Gold Inlays, Demonstrating Cold Methods.

Dr. A. H. Stevenson—Dental Hygiene Assisted by Two Dental Hygienists.

Dr. Edward Kennedy—Cast Clasps for Removable Appliances.

Dr. Robert H. Ivy—Dental Cysts.

#### BANQUET.

The Fortieth Anniversary Banquet will be given in the Hotel Adelphia, Gold Room, on Friday, June 11th, at 6.30. Subscription fee three dollars and fifty cents. Urge upon your classmates and friends to attend the banquet and thus show a fitting tribute to our retiring provost. Send remittance to Dr. Frederick W. Allen, Chairman, 911 Flanders Building, Philadelphia, Pa.

#### REUNIONS.

Class of 1885, Chairman, Dr. Victor S. Jones, Bethlehem.

Class of 1890, Chairman, Dr. A. T. French, Pennsylvania Bldg., Philadelphia.

Class of 1895, Chairman, Dr. W. E. Harris, 211 W. 10th st., Wilmington, Del.

Class of 1900, Chairman, Dr. Alfred P. Lee, 1616 Locust st., Philadelphia.

Class of 1905, Chairman, Dr. W. G. Cook, New Jenkins Bldg., Pittsburgh.

Class of 1910, Chairman, Dr. James Ivory, Binghamton, N. Y.

Class of 1915, Chairman, Dr. Creston Sutch, 224 Harvey st., Philadelphia.

ALUMNI DAY—JUNE 12TH.

2.30 P. M. Classes in costume will march from Dormitory Quadrangle to Franklin Field, enter without charge and be reviewed by the Provost, Vice-Provost and members of the Faculty.

3.00 P. M. Baseball game between the University of California, Champions of the Pacific Coast, and the University of Pennsylvania. Ladies and friends of the graduates are invited to attend. Admission free.

5.00 P. M. Circus in Quadrangle by undergraduates.

8.00 P. M. The Musical Clubs and the Mask and Wig Club will entertain.

9.00 P. M. Dancing in Weightman Hall.

For further information, address

Z. T. JACKAWAY, *Sec'y-Treas.*,

1506 E. Susquehanna ave., Philadelphia, Pa.

at which some interesting announcements for the university will be featured.

We extend an earnest appeal to every alumnus to attend the entire session.

JAMES L. MORLAN, *Sec'y*,  
25 E. Washington st., Chicago.

### Baltimore College of Dental Surgery.

#### REUNION OF CLASS OF 1915.

THERE will be a reunion of the Class of 1915, Baltimore College of Dental Surgery, at Baltimore, on June 21 and 22, 1920.

The class will assemble at the College building at 2 P. M. on the 21st, where clinics and demonstrations will be held. There will be a banquet at one of the local hotels on the evening of the 21st, and a theater party the evening of the 22d.

For further information communicate with the secretary of local committee.

GUY O. LYON, *Chairman*,  
JAS. H. FERGUSON, *Sec'y*,  
914 N. Charles st., Baltimore.

### Southern California Dental Society.

THE twenty-third annual meeting of the Southern California Dental Society will be held at the University of Southern California College of Dentistry, June 28 to 30, 1920.

The week preceding the meeting a post-graduate course of the following courses will be given:

1. Crown and Bridge Work, with Attachments on Vital Teeth, using Tinker's Technique—Dr. Theo. W. Maves, Minneapolis.

2. Porcelain.—Dr. Walter Hine, New York.

3. Prosthodontia—Dr. I. Lester Furnas.

For further particulars consult

Dr. BERT BOYD,

1010 Story Bldg., Los Angeles, Calif.

### Northwestern University Dental School.

#### NOTICE TO ALUMNI.

OUR next regular Homecoming Clinic will be a two-day meeting, June 14 and 15, 1920. Clinics and lectures on some of our most important present-day professional problems will be given by men of ability and reputation. The program will be full and profitable. In addition we are to have a splendid banquet,

### New Jersey State Dental Society.

THE annual meeting of the New Jersey State Dental Society will be a celebration of its fiftieth anniversary. It will be held on Young's Million Dollar Pier, Atlantic City, N. J., on July 14, 15, and 16, 1920. The presence of men of national reputation will make it a memorable gathering.

Dr. W. W. Hodges, chairman of the Essay Committee, announces that Dr. Edward C. Kirk of Philadelphia, Dr. Otto U. King, secretary of the National Dental Association, Dr. John V. Konzett of Dubuque, Iowa, president of the National Dental Association, Dr. Thomas B. Hartzell of Minneapolis, and Dr. Wayne Babcock of Philadelphia, will present able papers.

Dr. Frank L. Manning, chairman of the Clinic Committee, has arranged for study classes to be conducted by Dr. John V. Konzett on Gold Inlays, Dr. John B. Hartzell on Pyorrhea and Prophylaxis, and Dr. Frederick Ream on the X-ray. In addition, general clinics will be given by men from the component societies, and also by clinical clubs.

Dr. Albert Kerr, chairman of the Exhibit Committee, is planning for the greatest display of dental goods and preparations ever

shown at a dental convention. This exhibit alone will be worth visiting, and in conjunction with the other features will make the meeting the best in the history of the society.

All ethical practitioners are cordially invited to attend.

For a list of hotels or other information, address

F. K. HEAZELTON, *Sec'y*,  
223 E. Hanover st., Trenton, N. J.

### Virginia State Dental Association.

#### CHANGE IN PLACE OF MEETING.

THE fifty-first annual meeting of the Virginia State Dental Association will be held at the Virginian Hotel, Lynchburg, Va., June 30 to July 3, 1920.

HARRY BEAR, *Sec'y*,  
410 Professional Bldg., Richmond, Va.

### Psi Omega Fraternity.

THE reunion and convention of Psi Omega Fraternity will be held at Cedar Point, Ohio, Monday, Tuesday, and Wednesday, July 12, 13, and 14, 1920.

E. L. PETTIBONE,  
Cleveland, Ohio.

### Wisconsin State Dental Society.

#### GOLDEN JUBILEE MEETING.

THE fiftieth annual (Golden Jubilee) meeting of the Wisconsin State Dental Society will be held in Milwaukee, Wis., July 13, 14, and 15, 1920.

W. F. FAUST, *Sec'y*,  
308 North ave., Milwaukee, Wis.

### Canadian Dental Association.

THE Canadian Dental Association will hold its tenth biennial meeting in Ottawa, Can., August 17, 18, 19, and 20, 1920.

SYDNEY W. BRADLEY, *Sec'y*,  
206 Laurier ave., W., Ottawa, Ont.

### Georgia Board of Examiners.

THE Board of Dental Examiners of Georgia will meet in Atlanta at the Piedmont Hotel on June 7, 1920, for the purpose of passing upon applicants for licenses to practice den-

tistry in Georgia. Those interested will please take notice.

Any additional information may be had by writing the secretary.

THOMAS COLE, *President*,  
Macon, Ga.  
D. D. ATKINSON, *Sec'y*,  
Brunswick, Ga.

### Colorado State Dental Board.

THE Colorado State Board of Dental Examiners will meet for the purpose of examining candidates for license to practice in Colorado, at Denver, Colo., at the State-house, beginning June 1, 1920, at 8 A.M.

For further particulars and application blanks address

R. C. QUICK, *Sec'y*,  
310 Metropolitan Bldg., Denver, Colo.

### Iowa Board of Examiners.

THE Iowa State Board of Dental Examiners will meet for the purpose of examining candidates for license to practice in Iowa, at Iowa City, College of Dentistry, beginning Monday, June 7, 1920, at 9 A.M.

For further information and application blanks, address

C. B. MILLER, *Sec'y*,  
726 Fleming Bldg., Des Moines, Iowa.

### Michigan State Dental Board.

THE next meeting of the Michigan State Dental Board for examinations will be held at Dental College, Ann Arbor, Mich., June 14th to 19th. Anyone interested; communicate with the secretary.

B. S. SUTHERLAND, *Sec'y-Treasurer*,  
Owosso, Mich.

### Tennessee Board of Examiners.

THE Tennessee Board of Dental Examiners will hold their annual meeting for examination of applicants at the Tennessee Dental College, Memphis, Tenn., beginning June 10, 1920, at 9 A.M. Application must be filed with secretary five days before the board meeting.

F. W. MEACHAM, *Sec'y-Treasurer*,  
Hamilton Nat. Bk. Bldg., Chattanooga, Tenn.



### Maryland Board of Examiners.

THE Maryland Board of Dental Examiners will meet for examination of candidates for certificates in Baltimore, at the Dental Department of the University of Maryland, on June 9 and 10, 1920, at 9 A.M.

For application blanks and further information, apply to  
F. F. DREW, *Sec'y*,  
701 N. Howard st., Baltimore, Md.

### Virginia Board of Examiners.

THE next meeting of the Virginia State Board of Dental Examiners will be held in Richmond, at the Medical College of Virginia, beginning promptly at 9 o'clock, Tuesday, June 8, 1920. For further information and application blanks, address

J. LEWIS WALKER, *Sec'y*,  
505 Taylor Bldg., Norfolk, Va.

### Oklahoma Board of Examiners.

THE next meeting of the Oklahoma State Board of Dental Examiners will be held June 7 to 12, 1920, in the Capitol Building (Senate Chamber) Oklahoma City. Oklahoma applications must be in at least ten days before examinations. Reciprocity has been canceled with all States.

L. M. DOSS, *Sec'y*,  
Oklahoma City, Okla.

### Nebraska Board of Examiners.

THE next examination of the Nebraska Board of Examiners will be held June 8 and 9, 1920, in Omaha, and in Lincoln, on June 8th, 9th, 10th, 11th, and 12th. The examination in practical work will be June 8th and 9th, at Creighton University, Dental Department, Omaha, and at the University of Nebraska, College of Dentistry, Lincoln. The written examination will be given June 10th, 11th and 12th, at the State-house, Lincoln.

Applications should be on file with this department not later than May 24th.

H. H. ANTLES, *Sec'y*,  
Lincoln, Nebr.

### Massachusetts Board of Examiners.

THE Massachusetts Board of Dental Examiners will hold an examination for registration June 14th to 18th inclusive. The practical examination will be held at Harvard

University Dental Department, Longwood ave., Boston, Mass., commencing Monday, June 14th. Applicants must file their applications at least ten days prior to above date. Full information and application blanks may be secured by addressing

JOSEPH N. CARRIERE, *Sec'y*,  
352 Main st., Fitchburg, Mass.

### Wyoming Board of Examiners.

THE next meeting of the Wyoming Board of Dental Examiners will be held at Cheyenne, Wyo., on June 28 to 30, 1920.

For further information and application blanks, address  
PETER APPEL, JR., *Sec'y*,  
P. O. Box 643, Cheyenne, Wyo.

### Florida Board of Examiners.

THERE will be a meeting of the Florida State Board of Dental Examiners June 11, 1920, at Miami, Fla., for the purpose of examining all qualified applicants who may come before them at that time. All applications should be in two weeks prior to the examination.

For further information address

R. P. TAYLOR, *Sec'y*,  
414-415 St. James Bldg., Jacksonville, Fla.

### Connecticut Dental Commission.

THE Dental Commissioners of Connecticut will meet at Hartford, Conn., June 17, 18, and 19, 1920, to examine applicants for license to practice dentistry, to examine dental hygienists for license to practice, and to transact any other business proper to come before them.

For further information, address

EDWARD EBERLE, *Recorder*,  
902 Main st., Hartford, Conn.

### Alabama Board of Examiners.

THE Board of Dental Examiners of Alabama will conduct an examination for certificates to practice dentistry and dental hygiene (for women) at the Birmingham Dental College, Birmingham, Ala., Monday, June 21, 1920, at 9 A.M.

Properly filled application blanks must be in the hands of the secretary not later than June 7th.  
A. K. PARKS, *Sec'y-Treasurer*,  
412-14 1st Nat. Bank Bldg., Montgomery, Ala.

### Illinois Department of Registration and Education.

THE Department of Registration and Education of Illinois will hold an examination for dentists in Chicago the week commencing Monday, June 21st. Complete application and examination fee of \$20 must be on file in this office by June 10th. For application blank and further information, address

F. C. DODDS, *Supt. of Registration*,  
Springfield, Ill.

### Wisconsin Board of Examiners.

THE next examination of the Wisconsin State Board of Dental Examiners will be held in Milwaukee, Wis., beginning June 21, 1920.

All applications and credentials must be in the hands of the secretary at least ten days before the examination. Full information and application blanks may be received by addressing

WILLIAM KETTLER, *Sec'y*,  
801 3d st., Milwaukee, Wis.

### Rhode Island Board of Registration.

THE regular semi-annual meeting of the Rhode Island Board of Registration in Dentistry for the examination of candidates will be held in the State-house, Providence, R. I., June 29, 30, and July 1, 1920.

All applications with the proper fee must be filed one week previous.

For further information address

ERNEST A. CHARBONNEL, *Sec'y*,  
334 Westminster st., Providence, R. I.

### Vermont Board of Examiners.

THE next meeting of the Vermont Board of Dental Examiners for the examination of candidates to practice in Vermont will be held at the State-house, Montpelier, June 28, 29, and 30, 1920. Candidates will present for registration and preliminaries at 10 A.M., Monday, the 28th.

To be eligible for examination a candidate must be (1) twenty-one years of age, (2) a graduate of a high school of the first class, (3) a graduate of a reputable dental college. Applications must be in the hands of the secretary not later than June 21st.

For further information and application blanks, address

HARRY F. HAMILTON, *Sec'y*,  
Newport, Vt.

### North Carolina Board of Examiners.

THE next meeting of the North Carolina State Board of Dental Examiners will be held at Wrightsville Beach, Wilmington, N. C., beginning promptly at 9 o'clock on Saturday morning, June 19, 1920.

For further information and application blanks, address

F. L. HUNT, *Sec'y*,  
Asheville, N. C.

### South Dakota Board of Examiners.

THE next meeting of the South Dakota State Board of Dental Examiners will be held in Sioux Falls, S. D., June 23, 24, 25, and 26, 1920, beginning promptly at 1 P.M., June 23d. All applications must be in the hands of the secretary a week before examination. Fee for examination, \$25; no reciprocity or interchange.

Full information and application blanks may be had by addressing

LYLE S. SPENCER, *Sec'y*,  
Watertown, S. D.

### California Board of Examiners.

THE next meeting of the Board of Dental Examiners of California for the purpose of examining applicants for license to practice dentistry in that State will be held in the city of San Francisco, beginning on June 21, 1920, at 9.30 A.M. Each applicant shall file with the secretary of the Board fifteen days before that date the following credentials: (1) diploma or certificate of graduation from a reputable dental college approved by the Board; (2) a diploma from an accredited high school or a certificate signed by the State Superintendent of Public Instruction (or similar officer), to the effect that the applicant has had scholastic preparation equivalent in all respects to that demanded for graduation from a high school giving a four-year's course of instruction. In lieu of high-school credentials, an applicant, who has been a licensed practitioner of dentistry of some other State of the United States for a period of at least five years, shall file such license or licenses which will be accepted; (3) a testimonial of moral character; (4) a recent unmounted photograph.

For further information, address

C. A. HERRICK, *Sec'y*,  
133 Geary st., San Francisco, Calif.



### Mississippi Board of Examiners.

THE next regular annual meeting of the Mississippi Board of Dental Examiners will be held in the Senate Chamber at Jackson, June 15, 1920, according to the State law. For further information address

B. J. MARSHALL, *Sec'y*,  
Marks, Miss.

### District of Columbia Board of Examiners.

THE next meeting of the Board of Dental Examiners of the District of Columbia will be held June 21st to 24th at the George Washington University.

For information and application blanks address

M. M. DOLMAGE, *Sec'y*,  
825 Vermont ave., N. W., Washington, D. C.

### Pennsylvania Board of Examiners.

THE next meeting of the Board of Dental Examiners of Pennsylvania will be held in Philadelphia and Pittsburgh, on Wednesday, Thursday, Friday, and Saturday, June 23, 24, 25, and 26, 1920. The theoretical examinations will be held at Musical Fund Hall, 808 Locust st., Philadelphia, and at the College of Pharmacy, Bride and Bluff sts., Pittsburgh. These examinations will begin on Wednesday, June 23d, at 9 A.M., and will continue Thursday and Friday. The examination in practical work will be held on Saturday, June 26th, at 8.30, and will be held at the Evans Institute, Fortieth and Spruce sts., Philadelphia, and the University of Pittsburgh, Pittsburgh.

Application papers may be secured from the Department of Public Instruction, Harrisburg. For further information apply to

ALEXANDER H. REYNOLDS, *Sec'y*,  
4630 Chester ave., Philadelphia.

### New Jersey Board of Registration.

THE State Board of Registration and Examination in Dentistry of New Jersey will hold their regular examination in the 2d Regiment Armory, Trenton, N. J., June 28, 29, and 30, and July 1 and 2, 1920. License fee, \$25; re-examination fee, \$10.

Practical tests required: Insertion of an approximal gold filling with the approximat- ing tooth in position, compound approximal

amalgam filling, and a silicate filling—candidate must furnish his own patient; taking of impression, bite, selection of teeth, articulation, trial plate—candidate must furnish his own patient; practical examination in mouth diagnosis.

Attention is directed to the following quotation from the dental law of New Jersey: "Applicant shall present to said board a certificate from the Commissioner of Education of this State, showing that before entering a dental college, he or she had obtained an academic education consisting of a four-year course of study or the equivalent thereof." In accordance with this law the secretary will issue application blanks only upon presentation of the required certificate from the Commissioner of Education, State-house, Trenton, N. J.

Applications must be filed complete ten days before the date of the examinations. Address all communications for further particulars to

JOHN C. FORSYTH, *Sec'y*,  
429 E. State st., Trenton, N. J.

### New Hampshire Board of Examiners.

THE New Hampshire State Dental Board will hold its next meeting for examinations on June 30, July 1 and 2, 1920.

HARRY L. WATSON, *Sec'y*,  
913 Elm st., Manchester, N. H.

### Arkansas Board of Examiners.

THE next meeting of the Arkansas State Board of Dental Examiners will be held at Hotel Marion, Little Rock, Ark., July 5, 6, and 7, 1920, beginning promptly at 8 o'clock Monday morning, July 5th. For further information and application blanks, address

H. J. GREEN, *Sec'y*,  
Paragould, Ark.

### Delaware Board of Examiners.

THE next examination of the Delaware State Board of Dental Examiners will be held in Wilmington, Municipal Building, 11th and King sts., July 14 and 15, beginning promptly at 9 A.M. All applications must be in the hands of the secretary at least ten days before the examination. Full information may be received by addressing

W. S. P. COMBS, *Sec'y*,  
Middletown, Del.



**Montana Board of Examiners.**

THE Montana State Board of Dental Examiners will hold their regular examinations at Helena, Mont., July 12, 1920. Applications should be in the hands of the secretary at least ten days before the examinations.

T. M. HAMPTON, *Sec'y*,  
Helena, Mont.

**Maine Board of Examiners.**

THE regular meeting of the Maine Board of Dental Examiners will be held at the State-house, Augusta, Me., July 7, 8, and 9, 1920, beginning at 8.30 A.M., July 7th.

All applications must be in the hands of the secretary on or before June 28, 1920. Fee for examination—dentists, \$20; dental hygienists, \$10. Any further information and application blanks will be furnished by addressing

HENRY GILMAN, *Sec'y*,  
192 State st., Portland, Me.

**Idaho Board of Examiners.**

THE next regular examination for the dentists will take place in the Capitol Building, Boise, Idaho, on July 13, 1920. The examination will extend over a period of four days.

Changes have been made in the administrative features of the Idaho Dental Law, whereby this department assumes those duties with the assistance of the dental committee or board, consisting of five dentists, the department handling the administrative features while the committee handles the professional features, such as conducting of examinations, granting of reciprocal licenses, adoption of educational requirements, etc.

All inquiries should be addressed to the Department of Law Enforcement, Boise, Idaho.

PAUL DAVIS,  
*Director*, Bureau of License,  
Department of Law Enforcement,  
Boise, Idaho.

# UNITED STATES PATENTS

## PERTAINING TO OR APPLICABLE TO DENTISTRY

ISSUED DURING APRIL 1920.

*April 6.*

- No. 1,335,717, to WILLIAM ARKIN. Artificial tooth.
- No. 1,335,734, to FRANK Z. HANSCOM. Anterior tooth and backing.
- No. 1,335,825, to WILLIAM L. ELLERBECK. Tooth-polishing device.
- No. 1,335,978, to J. E. REID and C. KIENLE. Dental instrument.
- No. 1,336,345, to GEORGE T. CORNELIUS. Dental toilet case.
- No. 1,336,390, to J. A. SARGERY and O. DUPONT. Fountain toothbrush.
- No. 130,039, to BAKER and COMPANY, INC. Trade-mark for gold alloy for dental clasps and the like.

- No. 139,040, to BAKER and COMPANY, INC. Trade-mark for white gold for dental shells and plates.

*April 13.*

- No. 1,336,746, to JAMES W. IVORY. Rubber-dam clamp appliance.
- No. 1,337,173, to DAVID G. WHITE. Reversible toothbrush.

*April 27.*

- No. 1,338,068, to ALDEN J. BUSH. Dental chart.
- No. 1,338,415, to DAVID WILLIAM BARROW. Dental appliance.
- No. 54,980, to GILDEROY O. BURLEW. Design for tooth cleaning and polishing device.





DR. WILLIAM MILLER COOPER.



# THE DENTAL COSMOS

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VOL. LXII.

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No. 7

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## ORIGINAL COMMUNICATIONS

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### Some of the Essentials of Dental Radiography.

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By RAYMONDE A. ALBRAY, D.D.S., Newark, N. J.

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(Read before the Plainfield (N. J.) Dental Society.)

IN presenting this paper it is not my thought or purpose to pose as especially gifted in radiographic knowledge, or to attempt to discourage anyone from taking up the use of this great diagnostic aid to our profession. There are a number of phases of radiography which are given too little consideration by the dentist either contemplating the purchase of radiographic equipment or who has already installed one, or who has radiographs presented to him for interpretation and diagnosis. The general practitioner has been rather impressed that the machine was just about all there was to the subject, the other elements entering into the production of a readable radiograph, and the ability to interpret the so easily produced radiograph, being mere matters of detail.

My purpose in writing this paper is solely to bring to your attention, in a rather incomplete manner, some of the important steps and procedures which are essential if radiographs of good quality are to be produced and reason-

ably accurate diagnoses made therefrom. It would be impossible in a paper such as this to more than direct attention to the various phases of the subject, and that is about all I can do in the time at our disposal, but if I succeed in convincing you of the necessity for careful study before attempting to produce or interpret radiographs, and the necessity for conservative practice of this art, I shall have accomplished my object.

Without doubt the question of the influence of focal infection about the teeth and its effects on the general health and well-being of the individual is at present one of the most discussed topics of the day, not alone in medical and dental circles but among intelligent laymen. Radiographic findings have been largely responsible for this state of affairs and as the employment of the roentgen ray is becoming so much a part of our work, it is well that due consideration be given to so important a subject.

There is, I feel, great need that a word of warning be sounded at this time, for

I am fearful that the use of this most wonderful and helpful agency may come into disrepute unless a curb is put on the enthusiasm of some and the dishonest commercialism of others.

Let me make myself clear on this point before I proceed further, as it alone I think will justify the paper. All of us remember, just as a single example, gas-oxygen analgesia and anesthesia. It was exploited as one of the greatest boons of the age to humanity in the dental office. Soft-spoken, persuasive salesmen and demonstrators, with a variety of machines, each one the acme of perfection and almost guaranteed to work alone, sold thousands of them to dentists who had up to that time almost no experience with the use of nitrous oxid. It was so easy, at least it looked to be when a trained anesthetist was operating the machine, that there seemed no difficulty in its use; but how different when alone in your office with the full responsibility on your own shoulders; perhaps you had a nervous patient and for some reason or other the machine not working quite right. What has become of nitrous oxid-oxygen analgesia and anesthesia today? How much do you hear of it? And yet it was and still is, in the hands of an operator who understands its use, of tremendous value in dental practice.

What is the reason for this condition of affairs? Simply that a large percentage of the men who purchased these nitrous oxid-oxygen machines were persuaded to do so by the salesman, and the purchaser thought all he had to do was turn a few valves, and the machine would do the rest. He was carried away by the enthusiasm of seeing an expert work and did not take into consideration the fact that it took years of study and experience to become thus adept.

It is the same with the X-ray machine. When the manufacturers saw the possibility of making and selling X-ray machines to the dentists, they inaugurated extensive advertising campaigns and their salesmen would each and every one have you believe that after purchasing his particular make of apparatus, all you

have to do is to place a film in the patient's mouth, throw a switch and, lo and behold, your patient is in the office of an X-ray specialist, *pronto!*

The above is simply a criticism of the methods of some of the salesmen for these concerns. Credit must be given to the manufacturers, who have worked to develop the X-ray apparatus to the present high standard of efficiency, and I take pleasure in so doing.

Here is where I wish to preach a little and show the fallacy of such methods. That you may know my position let me say that I first began the use of the X-ray in my practice fifteen years ago, working at that time with a physician, and have been using my own equipment for about ten years. My experience has convinced me that there is far more to radiography than "merely pressing a button and every picture a good one" as one advertisement would have us believe.

#### EQUIPMENT.

There are a number of excellent machines on the market at the present time, several coil machines designed to operate on the 110-volt current and the larger variety employing the 220-volt current. Most manufacturers are extensively advertising and pushing the units with the Coolidge tube. I personally prefer the gas tube and do not care for the unit type of machine. However, good work can be done with either variety, but whatever type of apparatus is used the operator should be thoroughly familiar with the machine and the nature of the energy he is using. The spark gap, amperage, vacuum of the tube, and the length of exposure of the film to the rays all have an important bearing on the quality of the radiograph. My advice is to purchase a machine which has sufficient power so that it will not be necessary to extend it to full capacity when in use. Tubes should be selected with a view to extended service. Dentists are usually persuaded or advised to purchase a fine focus tube. This I consider a mistake, for the target of a fine focus tube will pit very quickly and then



the tube must be laid up for repairs which are apt to be rather costly. A tube of medium focus will last far longer and give much greater satisfaction.

The penetration of the rays varies with the vacuum of the tube, the amount of current, and spark gap. The quality of the radiograph is also largely dependent upon these conditions. A hard tube gives better penetration through dense bone than a soft tube, but for dental radiographs a medium soft tube will give far better definition and detail, and the life of the tube will be longer than if continually worked when hard. Do not attempt to make radiographs with a very soft tube. If exposures be made with too soft a tube, varying densities of the bone will be lost and errors in diagnosis are sure to result. My experience with tubes has convinced me that each one will give best results at a certain vacuum, spark gap and amount of current, and I have a number of tubes, each having been studied and these peculiarities noted. I use them for different cases and to obtain definite types of radiographs. Frequently I make two exposures of one area, one with a hard and another with a soft tube. I do this for the purpose of comparing the radiographs when the interpretation and diagnosis is doubtful. Exposures must be slightly longer when working with a soft tube than with the hard. The danger of burns is always present and too long, too frequent, or too many exposures must not be made. It is easier to burn a patient with the soft tube than with the hard tube technique. Experience and careful comparison of each case with the time of exposure, quality of the tube, amount of current, density of parts must be your guide in arriving at a knowledge of the above-mentioned factors and the practical application of the principles involved.

When employing the X-ray it is necessary to have the patient in some type of chair with a rest or support for the head. There are several reasons why the ordinary dental chair is not well adapted for this purpose. First, it is largely metallic in construction, and if

there happens to be, as there frequently is on cold or damp days, static current in the air, the patient may get a rather strong shock when the tube is activated. This same is true of any metal chair. Second, some of the rays strike the metal and are apt to be deflected and produce peculiar markings on the film, which may cause errors in diagnosis or render films valueless. I use a wooden arm-chair with a specially constructed head-rest, and so obviate these difficulties. The operator should always work from behind a lead screen for his own protection. It is exceedingly dangerous to hold films in the mouth of a patient or have an assistant do it. We know that the rays have caused burns and destruction of tissue, and even loss of life, so why take unnecessary chances?

#### MAKING X-RAY EXAMINATIONS.

Having a machine and tube and understanding their uses, the next important point to be considered is to have a definite reason for making a radiographic examination. This may seem like a strange statement, but to one who sees the work of quite a number of laboratories and individual X-ray operators, it is not surprising. I have seen many cases where complete mouth examinations have been made where there was no reason whatever for such a procedure, and the operator if he knew anything at all also knew that there was no necessity for so doing. The only reasons which can be advanced for this method of practice are ignorance or mercenary or both. When you have determined that the radiographic examination of an area or of several areas is necessary, the following points must be carefully considered if you are to render your patient proper service.

A thorough and painstaking examination must be made of the part under suspicion, the tooth or teeth must be carefully examined for cavities, which, with all fillings, should be charted. If a tooth is discolored, loosened, rotated, sore or missing note should be made of the fact. Response to thermal changes should be well considered, pyorrheal pockets, in-



flamed gingival margins, fistulæ, swellings of the gum or about the roots of the teeth, traumatic occlusion, crowns, either porcelain or gold should all be recorded. All of the above objective symptoms and the subjective symptoms and history as obtained from the patient are absolutely essential to proper interpretation and diagnosis of radiographs.

#### TECHNIQUE OF MAKING THE RADIOGRAPH.

Having a complete history of your case with a thorough clinical examination, it is to be presumed that a fairly definite picture of the condition you suspect is in mind, and the next step is to either confirm or disprove your diagnosis with the radiographic findings. To do this it is necessary to place the unexposed film behind the area to be radiographed and a great deal depends upon the position in which this film is placed, its relation to the teeth and to the rays from the tube. The lower bicuspid and molars are as a rule much easier to radiograph without distortion than the others, but by studying the height of the arch and the angle of the film in relation to the roots of the teeth, it is possible to produce radiographs with little or no distortion, if this is the object sought. Frequently it is advisable or necessary to place the tube in such manner as to produce very marked distortion in order to make the proper diagnosis. I shall explain this statement in considering interpretation. The film package should be held firmly in place against the area to be radiographed and I have found nothing better than a finger of the patient for this purpose, the patient being instructed to close the jaws on the finger as a means of preventing the film from slipping. When placing a film package for the lower bicuspid or molars it should be put in position against the teeth and held there by the operator and the patient instructed to close the jaws, not the mouth or lips but the jaws. This will cause the relaxation of the muscles which depress the mandible and the film package can be slipped into place without injury to the soft tissues under the

tongue. Some patients and operators find this rather difficult to do, but once the trick is mastered most of the gagging and discomfort so frequently encountered in placing film packages in this part of the mouth will be overcome. Do not be content with one film in making a diagnosis. The comparison of two or three radiographs of the same area from different angles will often be sufficient to prove the inadvisability of making a diagnosis from a single radiograph of an area. I shall enlarge on this phase of the subject later in the paper.

#### DANGER OF BURNS.

As previously stated there is danger of injuring a patient with the use of the radiographic apparatus. The greatest danger is probably from the rays themselves, although a severe electrical shock may be given the patient by allowing the wires leading to the tube, or the tube itself, to come in too close proximity to the patient, or to a metal chair in which the patient is seated. Both lead wires and tube should be at a greater distance from the patient than the width of the spark gap at which you are working. Burns from the roentgen rays themselves will vary in degree from a very mild dermatitis resembling a light sunburn to the actual destruction of the tissues exposed to the action of the rays.

Too frequent or too long exposure will produce the above-mentioned burns, and it is well to ascertain from patients presenting for radiographs if they have been exposed to the rays recently and to obtain some idea as to what was done. Ordinarily a full dental series of ten or twelve films can be made with perfect safety from burns, but I should hesitate to make further exposures until a month had elapsed unless there were urgent need for so doing, in which event the patient should be fully acquainted with the possible danger.

#### TIME OF EXPOSURE.

The time of exposure next must be considered, and will be governed by the

type of machine and tube, the vacuum of the tube, the spark gap, the amount of current being used, the probable density of the bone structure, distance of target from film and the speed of the emulsion on the film. These factors are only to be determined by the operator at the time the work is to be done, and all must be taken into consideration if satisfactory radiographs are to be made. Experience and experimentation with careful observation of the results produced under varying conditions of the above-mentioned factors is the surest method of becoming proficient in the proper timing of exposures.

One-second exposures are a thing of the past. The latitude between under- and over-exposure is too small and much valuable detail is lost in radiographs so produced.

#### DEVELOPING THE FILM.

Of great importance is the development of the exposed film, and many films which have been properly exposed are ruined for diagnostic purposes in the dark room. The dark room must have all light excluded, except that coming from the ruby lamp which should not be too bright, and the walls of the room should be painted black. Solutions for developing and fixing should be carefully prepared from chemicals of standard purity and mixed with accuracy. Distilled water should be employed and the solutions should be kept in dark brown bottles away from daylight. I deem it very unwise to use a developing solution which has begun to oxidize, and always employ a fresh solution for each set of films on the theory that it is cheaper and better for all concerned to waste a few cents worth of developing solution than to spoil and have to retake even a single radiograph, to say nothing of a whole series. The temperature of the developer is of great importance; best results are obtained at 65° F. A dairy or other thermometer is necessary for this determination. If the temperature of the developer is above 70° F., the films are almost certain to be fogged, if below

60° F., the hydrochinon practically ceases to operate and a poor negative is bound to result. It is useless to prolong the time of development when the developing solution is too cold, as nothing but a thin negative can be obtained which is worthless for diagnostic purposes. Films which are under-exposed are thin, and no amount of developing will bring out the necessary detail, and they always become fogged if left for too long a time in this solution.

Over-exposed films will flash up in a developer of proper temperature and blacken very quickly. If this occurs it is well to complete the time of development and reduce the negative after fixing. However, it is far better to correctly time the exposure. After the film has been developed to the right degree, it should then be washed for a few seconds in clean cold water before being transferred to the fixing bath, where it should stay for at least fifteen minutes, after which it must be washed in running water for twenty minutes before being dried. The acid fixing bath is preferable to the plain hypo in that it is less apt to cause staining of the films. The fixing solution can be used repeatedly. When using trays for developing and fixing do not attempt to work with too many films at one time, for if they overlap in either solution there will be marks from the uneven action of the chemicals. It is well to give the trays a rocking motion to insure even action of the developing and fixing agents.

Cleanliness in the dark room is of paramount importance, as stains on films greatly detract from their value and are almost certain to result from carelessness in handling while development and fixing is in progress. Trays or tanks should be thoroughly cleansed and a tray which is used for developer should not be used for the fixing bath or *vice versa*. Never handle films while being developed except with clean hands. Do not allow any hypo to get into the developer. Always see that films are thoroughly immersed in the developing and fixing solution or uneven development will result. Films should be dried by hanging



in a warm room of even temperature. The practice of using an electric fan is an unwise one, as uneven drying is very apt to produce water marks which may be mistaken for shadows. To interpret the radiographs properly it is necessary to be able to differentiate the density of the shadows produced on the negative. The quality of these shadows is very largely dependent upon the manner in which they are brought out in the developing solution, and consequently under- or over-developed films, fogged films from too warm or cold developer or from too strong a light in the dark room, films which are stained from careless handling, unclean chemicals or trays, insufficient washing, are all unreliable for the purpose for which they are intended and fall short of careful, conscientious radiographic work to just the extent that their quality is impaired.

#### INTERPRETATION OF RADIOGRAPHS.

Having reached this point in our discussion the next which naturally follows is the question of interpretation and diagnosis. Thus far it has been possible to work along quite definite lines in which fairly well understood technical processes have been involved. We are trained in examinations of the teeth and so can record clinical findings. The methods to be employed in the use of the machine and tubes, the placing of films, and developing processes are matters which can be readily acquired through demonstration, reading, and experience by the dentist who has sufficient intelligence and desire to produce good radiographs. Interpretation of radiographic findings calls for the exercise of a great deal of thought and the application of a knowledge of the anatomy and physiology of the parts being examined, an understanding of the pathological changes which may occur in these parts and intelligent consideration of the case history and clinical findings in their relationship to the radiographic disclosures. The radiograph through the shadows produced by different densities of the tissues or foreign substances is a

faithful record. The determination of the meaning of these shadows is a task which at times assumes the proportion of a Chinese puzzle. Some radiographs are, when studied with the clinical findings of the case, possible of almost instant diagnosis; others have to be carefully inspected with the magnifying glass, and several films of the area taken from varying angles, with different lengths of exposure and tubes of hard and soft quality before a satisfactory diagnosis can be made.

In studying radiographs do not confine yourself to the condition of the bone about the teeth to the exclusion of everything else. Rarefied areas are only a part of the story which the radiograph tells, and every dark spot at or near the apex of the root of a tooth is not necessarily an abscess or focus of infection.

Several illustrative cases may be cited at this point to better impress the idea I wish to convey.

CASE 1. Patient, woman, age forty, history of neuralgia, pain about jaw. Had consulted a physician and several dentists with no relief except through the use of hypnotics. The last dentist she had consulted noted that the third molar was missing and made a radiographic examination of the region. There were several very small fillings in the teeth, which were very closely approximated with broad flat contact surfaces. No cavities were apparent even on careful examination. The dentist who made the radiographs, and they were very good ones, told the patient that there was no impacted third molar, so her teeth were not the cause of her trouble. He was right as far as the third molar was concerned, but the first molar showed a large carious area involving the pulp, which had evidently originated under the small occlusal filling. Removal of the tooth gave almost instant relief from pain which had been quite constant for several weeks. The maker of these radiographs was simply looking for an impacted tooth and did not continue his study of the films beyond that point.

CASE 2. Patient, woman, age forty-five, severe pains on right side of head in the antral region with considerable distress in the eye. Excellent dental radiographs had been made by a dentist at the request of the patient's physician and the report was that the teeth showed no abscessed areas. The



case was referred to a nose and throat man, who sent the patient to me with the radiographs. Examination of the mouth and teeth disclosed a mild pyorrhea about most of the teeth, the upper first molar missing and the second molar quite loose, with a well-developed pyorrheal pocket along the anterior border. The radiograph of this area showed a considerable loss of bone extending to the floor of the antrum. With the history of the case before me, probable antral involvement was suspected and a very fine silver probe was inserted into the pocket, through which it passed directly into the antrum without much difficulty. Extraction of the tooth was performed and the antrum was found to be full of pus. Proper treatment was instituted with complete relief from the pain from which the patient had been suffering. Another illustration of lack of vision in reading a film.

I could cite numerous other instances of a similar nature but these will suffice. The uncertainty and undependability of a single film for diagnosis can be shown by citing from actual cases.

CASE 3. Patient, woman, age thirty-five, neuralgic pains and headaches on left side, of long duration. Teeth in excellent condition except that upper left bicuspid was missing, and had been replaced by a dummy attached to gold crown on the second bicuspid, a very fine piece of work, and in good condition. I radiographed the area and could find nothing in the first film to account for the pain. Several other films of that region did not offer any solution of the problem. In going over the case with the patient in an endeavor to get some kind of a clue she recalled that she did not remember ever having had the first bicuspid extracted. I immediately seized upon this statement as a possible solution and made several large radiographs of the palatal portion of the superior maxilla and there found the missing bicuspid, just posterior to the central on that side and probably causing pressure on the nerve at the anterior palatine canal. Removal of the tooth relieved the neuralgia.

CASE 4. Devitalized lower first molar in the mouth of a woman with a very light jaw. The roots were only partially filled and no area of destruction was discernible in a film taken with a very soft tube, but the same area when taken with a hard tube showed considerable destruction about the root apices.

CASE 5. Two radiographs of a Logan

crown on a central which was reported as sore did not disclose the cause. The root was well filled, and had no rarefied area about the apex. Another film of this tooth taken from the side in order to get a lateral view disclosed the pin penetrating the root distally.

#### DESIRABILITY OF MAKING RADIOGRAPHS FROM DIFFERENT ANGLES.

Here let me speak of the necessity for making radiographs from more than one angle. Take the upper first bicuspid for example; it usually has two roots. If you make your radiograph so that one root lies directly behind the other, how can you tell that both are filled to the apex? To be sure that both roots are filled it is necessary to distort the image of the tooth in the radiograph by placing the tube well forward of the usual position.

This same is true of lower first molars, which frequently have two canals in the anterior roots. There is no certainty that a tooth which ordinarily has one root may not have two canals or even two roots. I have a collection of a dozen or more laterals and cuspids with two roots, and a radiograph directly through these teeth would show apparently only one root. In my practice of radiography I purposely produce distortion of at least one film of each area I have under examination and the results have convinced me that this course is absolutely necessary in a great many instances. If the object of a radiograph is simply to confirm the filling placed in root canals, the examination of the film is somewhat different from that in which you are endeavoring to locate pathological lesions, but it is well to study each radiograph with great care to become thoroughly familiar with the shadows of the various portions of the jaws in health. This knowledge will be of great service in differentiating between physiological and pathological shadows. See all you can in every radiograph you examine.

Another habit which it is well to form is to compare your clinical findings and radiographic diagnosis with the actual condition which presents after you have

removed a tooth or opened into an area. Needless to say, this procedure will tend to make for proficiency in diagnosis.

An aid worth considering in making an interpretation of an area which has a fistulous opening about a tooth or at some distance from it, is to place a fine silver probe just as far into the area as it can be worked and take the radiograph with the probe in that position. Bismuth subnitrate in cocoanut oil injected into a fistula or into a necrotic area before making a radiograph will frequently be of assistance in determining the direction and extent of the destruction.

When examining a radiograph some of the particular conditions which should be looked for aside from the favorite rarefied area are thickening of the bone about the root apices due to traumatic occlusion, pyorrheal absorption of the alveolar process, carious cavities in the teeth, secondary caries under fillings or the edges of crowns, pulp stones, exostosis of the roots, fragments of roots of extracted teeth, impacted or unerupted teeth, foreign bodies, necrotic or cystic areas.

A few of the physiological structures to observe and not confuse with pathological conditions are the mental foramen, inferior dental canal in the mandible, the anterior palatine canal, antrum, nasal cavity, coronoid process of the mandible when examining radiographs of the maxillæ. Do not mistake areas about young teeth just erupting or recently erupted for abscesses. Teeth which have been undergoing orthodontic manipulation will frequently show what appears to be pathological lesions in the bone about their root apices. This matter must be given careful consideration in cases of this character.

Do not assume that a filling which appears in a radiograph to encroach on the pulp, actually does so, it may only be a shallow cervical restoration and at a distance from the pulp. Be careful not to mistake stains or water marks on the film for abscesses or necrosis. One very important point is to know a good from a poor radiograph, and to be able to decide as to whether or not the poor one is

sufficiently good for diagnostic purposes. It is good practice to keep radiographs in some kind of a filing system, each one with the date at which it was made. Comparison with those of the same area taken at a later date frequently affords valuable data in diagnosing obscure troubles. Occasionally, comparison of radiographs of the same area from similar angles on opposite sides of the mouth will prove enlightening and valuable aids in making a diagnosis. Do not assume that because a mouth or jaw, or a part of one, has no teeth that there may not be some pathological condition present. Only recently I have had three cases in which root ends were discovered in necrotic areas where the teeth had supposedly been all removed years previously.

Before closing I want to say a few words about the unreliability of the radiographs and diagnoses of many of the so-called X-ray laboratories and also by some physicians who claim to make dental radiographs. I can see no more justification for a physician taking and diagnosing dental radiographs than there is for a dentist taking a gastro-intestinal series of radiographs and making a diagnosis from the plates. I have seen some excellent dental radiographs made by physicians in which the diagnosis given would really have been humorous were it not for the fact that it was a matter of serious import to the patient. I have seen others in which the physician gave a long diagnosis of apical abscesses, and there were less than half of the teeth in which the apices of the roots showed on the radiographs, and strange to say some of these teeth were the ones which were described as having the apical infections. Most of the X-ray laboratory diagnoses are worse than this. I say most, for there are a few, but very few, who do fairly creditable work, but the cut-rate—four or five dollars for a whole series—laboratories I feel should not be countenanced by professional men and in my practice I will not accept the films (I do not dignify them by calling them radiographs) or diagnoses of these concerns. Several instances for example:



A gentleman presented a whole series with diagnosis of thirty teeth when he had only eighteen in his jaws. Where the others came from or to whom they belonged, we could not find out, for the laboratory assured us over the telephone that the films he had received were of his teeth.

Another case in which the films showed several small bridges in a mouth where every tooth was present and in exceptionally good condition.

A lady presented some films of her six upper incisors with a report saying that everything was normal. The roots of these teeth each carried a porcelain crown and the gums were badly hypertrophied and congested with several large fistulous openings discharging quantities of pus.

Surely not much dependence can be put in the findings of such concerns. We still produce occasionally poor radiographs in my practice and make errors in diagnosis, but fortunately for the patients with less frequency than was the case a number of years ago.

In conclusion let me caution you not to put entire dependence for diagnosis upon radiographic findings. Use the knowledge of pathology and dental disorders on which you depended for your diagnosis of a given condition before the advent of the X-ray in connection with the radiographs, and the patient will re-

ceive far better service and your conscience will be less troublesome.

Several excellent books which have been of great assistance to me are:

"Elementary and Dental Radiography," by Raper.

"Dental and Oral Radiography," by McCoy.

"Roentgenographic Diagnosis," by Tousey.

"U. S. Army X-ray Manual."

"Interpretation of Dental and Maxillary Roentgenograms," by Ivy.

"Systematic Development of X-ray Plates and Films," by Wendell.

Any dentist who desires to do so and is willing to devote the time to study and experimentation can make good radiographs and acceptable diagnoses from them, but the art is not one to be acquired in a hurry. Every error made in diagnosing from radiographs has a tendency to bring discredit upon this valuable aid to our profession. Do not blindly accept diagnoses made by other men, but study conditions and radiographs before so doing. The whole problem resolves itself into the fact that to do acceptable dental radiographic work and interpretation, the dentist must become thoroughly familiar with the subject in all its many ramifications and details, making special efforts to keep within conservative bounds.

340 BELMONT AVE.



## Novocain: The Preparation of the Solutions.

By C. EDMUND KELLS, D.D.S., New Orleans, La.

CREDIT TO WHOM CREDIT IS DUE.

**B**EFORE going into the subject of this contribution let us give a bit of history which, as far as the writer knows, has never appeared in our dental literature.\*

The following excerpt is taken from "New Methods of Anesthesia" by Dr. Rudolph Matas, published in the Special Number of the *Philadelphia Medical Journal*, November 3, 1900.

Thus we find that the first demonstration of the surgical value of neural cocaineization is due to Hall and Halstead, who experimented upon themselves and others in 1884.

Hall anesthetized his infra-orbital to anesthetize the teeth, and Halstead injected the inferior dental nerve at the spine of Spix with nine minims of 4 per cent. solution, thus obtaining a complete anesthesia of the gums, teeth, etc. (*Vide New York Medical Journal*, Dec. 6, 1884.)

Thus we learn to whom we are indebted for one of the greatest blessings ever conferred upon humanity—that of painless dentistry.

Dr. Hall has passed into the "great beyond." Dr. Halstead is now in Boston. Would it not be wonderful if the dental profession were to rise to the occasion and render unto Dr. Halstead some mark of its appreciation while he is here on earth?

\* [The author has evidently overlooked an editorial reference to the history of conduction anesthesia in the *DENTAL COSMOS* for April 1919, p. 329 *et seq.*, and also the report of experiments made in producing anesthesia by the conduction method before the New York Odontological Society and published in the *DENTAL COSMOS* for April 1885, p. 208 *et seq.*—Ed.]

When novocain was first introduced into this country it was accompanied by certain appliances for its preparation, which, while more or less pleasing to the eye, soon proved to have apparently no other intrinsic advantages, and these appliances are still in general use today.

### THE RINGER FLASK.

The so-called "Ringer" flask in general use today is the old time Schuster drop bottle. This may have been (though it is doubtful) very satisfactory when used for the purpose for which it was originally intended, but it is a veritable little pest when it comes to using it in dental practice. It is top heavy and, therefore, very easily toppled over. It is made of very thin glass and readily broken. When placed over the burner and the contents allowed to boil; there are no means for handling it while hot. The filler opening is always too small, and in some so small that a Ringer tablet will not drop through it; it is placed at an inconvenient angle; and it is not graduated.

Taking it all in all, it is evidently designed on the plan of an automobile, that is, great ingenuity has been expended upon it in concentrating the greatest number of disadvantages in the least possible space.

### THE WRITER'S FLASK.

In the flask now presented, it is believed that all these objectionable features as just enumerated have been eliminated and none others have been added.

The flask is a sturdy little affair and

it is not readily toppled over. Its filler opening is of generous size and placed in a logical position. It can be readily handled while hot by an ordinary clothes pin, one end of which has been cut down to fit the loop. A Peerless wood tongue blade can be cut down as shown in the cut and slipped under the loop, and in this way the flask can be handled with ease.

Taking it all in all, this is a very satisfactory flask and a very great improvement upon the form now in general use (Fig. 1).

FIG. 1.



Ringer flask showing clothespin handle in position and the blade in the foreground.

#### THE DISSOLVING CUP.

The porcelain dissolving cup with its dainty handle is a most attractive-looking little affair and that is the best that can be said for it. It is readily stained; it has a way all its own in getting overturned, which would seem impossible at first glance. It has an exasperating way of falling out of the handle at inopportune times. It comes in two sizes. The handle rusts. It is decidedly breakable.

The substitution of a test tube for this dissolving cup has many advantages, and the tube is well adapted to the writer's method of preparing his solution. It is more readily cleaned. It requires no handling during the preparation of the solution. Only one size is used. It is made of Pyrex glass and is not readily broken. It cannot be accidentally turned

over and contents spilled. It is graduated up to 10 c.c.

#### THE STAND.

Science is wonderful. It can always be changed from time to time to meet the exigencies of the case. First we were sold a container and told we *must* keep our syringes, dissolving cups, etc., in ab-

FIG. 2.



Novocain unit showing clearly the Ringer flask with its loop for handling and filler opening at the top. Bunsen burner is seen protruding through the base.

*solute* alcohol. Absolute alcohol was the *only* antiseptic in which to keep them sterile.

After dentists all over the country were pretty well loaded with absolute alcohol—that is, their glass containers were so loaded—along comes some bright star in the scientific firmament and informs them that absolute alcohol is not so satisfactory after all, that 70 per cent. alcohol and none other must be used.

As devotees of science, we all cheerfully changed over to 70 per cent., and there you are.

By "we all" is meant all who were

using the absolute alcohol. As for the writer, he had discarded that style of container long before. It was too "messy" and unsatisfactory for him.

Naturally, upon giving up this "sloppy" container, something else had to be substituted and here in Fig. 2 is seen the device as it now stands.

#### A NOVOCAIN UNIT.

Our novocain unit as shown in Fig. 2 consists of a base supporting a vertical rod which carries the several brackets needed for the various elements.

Here are seen our Ringer flask, the dissolving tube and two test tubes in which are kept the two syringes in use, all securely seated in their brackets and compactly arranged about the supporting rod.

Protruding through the base at the proper distance from the rod, is seen the outlet of a Bunsen burner specially designed for this unit. An alcohol lamp could be used, but gas is more convenient.

#### TO MAKE THE RINGER SOLUTION.

Partly fill the flask with freshly distilled water and shake it well so that every part of the inside of the flask is well reached, and then pour it out. Thus the flask is rinsed.

Partly fill the flask with freshly distilled water, place it in its rack, swing over the lighted burner and bring to a boil. Grasp the flask by means of one of the handles, and empty it. Thus is the flask sterilized. Then pour in 30, 60 or 80 c.c. of freshly distilled water, according to how much you desire to make, place over the flame and let it just come to a boil. Swing aside. Add the requisite number of Ringer tablets and again let it come *almost* to a boil. Swing aside. Then place a tuft of clean and sterile cotton in the inlet tube to render it dust proof, and the Ringer solution is made.

#### ISOTONIC SOLUTIONS.

True Ringer solution accurately and carefully compounded and injected into

the tissues should not cause swelling, post-operative pain or other uncomfortable results.

In order to make *true* Ringer solution, one must measure the required amount of water carefully and exactly, and bring to the boiling point and nothing more, or the quantity of water *will be reduced by evaporation*.

Then the Ringer tablets should be dissolved by heating, but this time the solution should not be allowed to boil, because if any of the *water is evaporated*, the remaining solution will be of a more concentrated strength, and thus not physiological.

As a temperature of 60° C. (140° F.) is all-sufficient for sterilizing, it can be readily seen it is perfectly safe to remove the flask from the burner just before it reaches the boiling point.

*Ringer solution, therefore, should never be boiled.*

#### TO PREPARE THE NOVOCAIN SOLUTION.

Place a small piece of sterile gauze on the base. Pour about 3 c.c. of freshly distilled water into the dissolving tube, put on the cover and allow to boil. This sterilizes tube and cover. Swing away from burner, place the cover on the sterile gauze, and empty the tube by means of the syringe, the platinum needle of which has been previously flamed. That rinses the syringe. Pour in the exact quantity of Ringer, swing back over the burner and bring almost to a boil. Swing away. Then drop in the required number of novocain tablets, and swing over the burner and dissolve. Swing away from the burner and fill the syringe. Place the cover on the tube.

#### THE BELL JAR.

A standard bell jar is provided by which the whole outfit is kept practically dust proof when not in use (Fig. 3).

#### CARE OF SYRINGES.

We are now dealing with the Fischer syringe, as this is used exclusively by the



writer up to this writing. Several other types of syringes are in the cabinet, but are not used, as they are not as satisfactory as the Fischer.

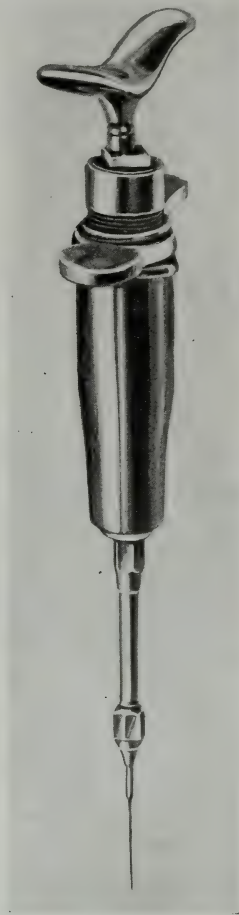
These Fischer syringes will not stand boiling when assembled, but, fortunately, there is no necessity of continually ster-

that? In the Fischer syringe, there is a space between the two metal bars and the glass barrel which must become contaminated when the syringe is placed in the mouth and against the lips, and, therefore, either this contamination must be prevented or the syringe sterilized.

FIG. 3.



FIG. 4.



ilizing the inside of a Fischer syringe once it has been made sterile.

A new syringe must be taken apart, boiled and assembled in such a manner that the inside of the barrel, etc., are sterile, and then if nothing but sterile solutions and sterile freshly distilled water are drawn into the syringe, they are always maintained in a perfectly sterile condition.

But the outside of the *barrel*—what of

Rather than keep this syringe in a sterile solution (a sloppy process), the writer prefers to prevent this contamination, which is effectually and readily accomplished.

#### THE JACKETED SYRINGE.

With a rubber-dam punch, punch a small hole in the end of a small thin

rubber finger cot. A small amount of talcum powder is dusted into the cot, and it is slipped over the syringe and the trick is done (Fig. 4).

No part of the barrel of the syringe ever touches the lips or tongue. The finger cots are readily and simply sterilized, the only wonder being that someone did not think of it before.

After use, the rubber jacket is removed and sterilized, the hub and needle wiped off with gauze and 70 per cent. alcohol. If it is a *steel* needle, it is thrown away; if it is platinum, it is flamed.

The dissolving tube is partly filled with freshly distilled water which is brought to a boil, and with this the syringes are well rinsed, after which they are placed in their racks, the needles and hubs being immersed in freshly distilled water (these racks can be *swung* over the burner and their contents brought to a boil when it is desired), and the bell jar put in place to keep the outfit dust proof.

#### CARE OF THE NEEDLES AND CHUCKS.

After use, platinum needles should be flamed, dipped in 70 per cent. alcohol, and then wiped off with a piece of gauze and flamed again. The extension pieces, chucks, etc., should be dipped in 70 per cent. alcohol and very carefully cleansed with a piece of gauze.

#### NO KINDERGARTEN.

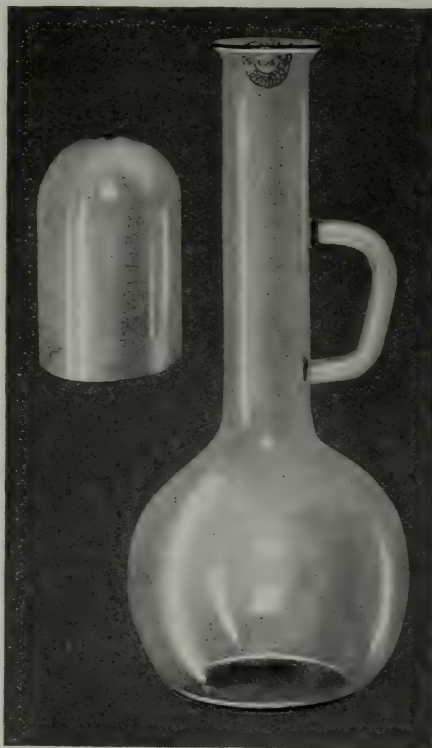
This being no kindergarten treatise upon the subject, no mention has been made (because unnecessary) of the fact that all platinum needles should be well flamed in the Bunsen burner always before and after each insertion and before putting them in any solution whatever; that steel needles should never be used for a second patient, and that a steel needle once used should not be returned to the solution for the purpose of filling the syringe. Extravagance, as a rule, cannot be too highly condemned, but there is no such thing as extravagance in the discarding of steel needles once used; that all lips of flasks and other

containers should be flamed (unless hot) before pouring out their contents; that there is no such thing as being too particular about every detail in the preparation and use of novocain.

#### BOILING FLASKS.

The designers of glassware evidently do not themselves use their own prod-

FIG. 5.



Boiling flask with handle and dustproof cap.

ucts, otherwise they would undoubtedly be of more practical shapes.

Place an ordinary 250 c.c. flask over a Bunsen burner, bring to a boil, and then how can one handle it while hot? Deponent explaineth not.

In Fig. 5 is shown a flask as designed, or rather modified by the writer for his own use. The common-sense handle in plain sight renders any further explanation unnecessary.

## A PILOT LIGHT.

In our office, such a little flask as just shown must be kept hot—not boiling—all day, for which purpose a small blue flame is necessary and one which will not readily blow out.

There being no such burner on the market (that is known of), many attempts were made to construct one, only to meet with failure. Fortunately, a mechanic in my employ suggested that

FIG. 6.



a Brays Luta burner be tried, and this proved most satisfactory.

The upright tube was removed from an S. S. White No. 20 gas burner, and the base threaded to fit the Brays burner. A piece of thin sheet brass was soldered over the opening under the base, and we have the finished product as shown in Fig. 6.

This gives a tiny perfectly blue flame which maintains the water in the flask at the desired temperature and never blows out.

## AN EMERGENCY HINT.

Upon witnessing an apicoectomy by one of the leading surgeons of an eastern

city a few years ago, there was unintentionally illustrated an emergency detail that was most effective.

The patient and operator were all properly staged for an *aseptic* operation. The patient's head was swathed in a sterile towel, the body was covered with sterile towels, the operating field was duly exposed and protected by sterile gauze and rolls, the parts sterilized with iodine and the primary incision was made.

Just at this point, the patient showed signs of fainting. What did our operator do? Remove all the sterilized gauze and give the patient a restorative to drink as most of us would have done, and thus undone in a second the preparatory work of minutes? Not at all. He reached for a glass syringe, filled it with aromatic spirits of ammonia and quickly dosed his patient without removing a thread!

His patient promptly revived and the operation proceeded as if nothing had happened.

Upon the completion of the operation, the writer immediately proceeded to the supply house and supplied himself with several of these glass syringes, which have been kept at hand ever since. In the several years which have elapsed since this clinic, these syringes have only been used a few times, but every time proved most effective and satisfactory. Upon one occasion, a very nervous patient was given the customary cup of coffee which she could not drink on account of the anesthesia of the lips. It was then fed to her with one of these syringes most satisfactorily. The syringe in question is seven and a half inches over all and has a capacity of 10 c.c. It is manufactured by P. J. McElroy, East Cambridge, Mass. The surgeon referred to is Dr. Kurt H. Thoma.

1237 MAISON BLANCHE.



## The Pathology and Treatment of Diseases of the Peridental Membrane.

By ARTHUR D. BLACK, A.M., M.D., D.D.S., F.A.C.S., Chicago, Ill

(Read before the Academy of Stomatology of Philadelphia, November 1919.)

THIS paper has been prepared with the belief that we might profit from a review of the situation as it confronts us today in the effort to do our part in the elimination and prevention of those chronic infections of the peridental membrane which present a definite menace to health and which are causing the loss of almost countless numbers of teeth.

Compared with all that has been published relative to the treatment of diseases of the peridental tissues, studies of the pathological changes have been very limited and have been reported for the most part within quite recent years. The earlier studies were devoted to deposits of calculus and the systemic disorders thought to be associated with or to be the cause of the deposits. Dr. J. M. Riggs<sup>1</sup>, to whom we must give the principal credit for calling the attention of the profession prominently to the diseases of the peridental membrane in the later sixties and early seventies, seems to have recognized no other cause than deposits of calculus. The articles in the "American System of Dentistry" in 1886 by Dr. G. V. Black were largely concerned with deposits of salivary and serumal calculus in relation to inflammations of the soft tissues adjacent to the teeth. However, in these articles separate terms were used to designate inflammations caused by deposits of calculus and those which were not. Among the important papers which attracted

the attention of the profession to systemic derangements, particularly gout, in relation to mouth conditions were those by Dr. Edwin T. Darby<sup>2</sup>, Dr. C. N. Peirce<sup>3</sup> and Dr. G. V. Black<sup>4</sup> in the early nineties. Dr. Darby's paper dwelt upon the relation of gout to erosion of the teeth, the other two to the relation of gout to the deposits of calculus.

A review of the literature previous to the last decade leads one to summarize the thought and practice of the profession as follows: Deposits of calculus were believed the only cause of peridental disease worth considering. This is reflected almost universally in articles on treatment. Studies of the pathological changes in the tissues were very meager, consisting of clinical observation of the inflamed soft tissues, the destruction of the bone of the alveolar process, and the presence of pus. Very few seem to have recognized the different types of injuries to the investing tissues, in one of which a definite pus pocket is formed and in the other a complete destruction of all overlying tissues without pocket formation. The divorcement of pathological studies and operative procedures has been a striking feature.

### PATHOLOGY.

It seems quite clear now that our practice in treating these diseases throughout the past half century has been due

<sup>1</sup> DENTAL COSMOS, 1869, p. 412, and 1882, p. 524.

<sup>2</sup> DENTAL COSMOS, 1892, p. 629.

<sup>3</sup> *International Dental Journal*, 1894, p. 1.

<sup>4</sup> *Dental Review*, 1894, p. 449.

to our lack of knowledge of the histopathology of the tissues, and your essayist is confident that we are approaching the time when we will be masters of the situation. Just so soon as the histological structure and physical powers of the cementum and peridental membrane are well understood and the full chain of pathological events is made out, will we have the foundation upon which to build rational treatment. The completion of these studies will in the opinion of the writer, lead us to make the following deductions:

*First.* Deposits of *salivary* calculus are not to be considered a cause of the formation of pus pockets.

*Second.* Deposits of *serumal* calculus on the enamel, under the free margin of the gingivæ, are the only deposits of calculus which should be considered a cause of the formation of pus pockets.

*Third.* Deposits of serumal calculus on the cementum are not to be considered a cause of the formation of pus pockets, but a result of the formation of the pockets.

*Fourth.* A high percentage of inflammations of the gingivæ, which lead to the formation of pus pockets, are the result of continued or often repeated irritations, other than deposits of calculus.

*Fifth.* Suppurative detachments of the peridental membrane from the cementum are permanent detachments.

*Sixth.* The treatment commonly in vogue today of removing deposits and applying medicaments is a failure as applied to established pockets.

*Seventh.* The simple surgical removal of the tissue forming the pocket is more rational and the results definitely beneficial.

*Eighth.* Improvement in the future must be principally along preventive lines.

Without attempting to review the literature of the subject, we shall refer to certain studies that have been made in recent years by the group of investigators with whom it has been the writer's privilege to be associated, acknowledging

the influence on our work of the studies and reports of many others throughout the profession. Acknowledgment is also accorded to Dr. G. V. Black's work on "Special Dental Pathology," not only for many of the statements herein made, but also for the inspiration which has led our entire group in Chicago to carry these studies along to the best of our ability. Let us take up our eight propositions in order.

Deposits of salivary calculus have been recognized as a cause of inflammation of the gingivæ and peridental membrane far back in the history of dentistry, but the nature of the injury to the soft tissues and alveolar process has not been well understood. If one will make a careful clinical study of cases presenting, he will soon recognize that the first little deposit is on the exposed surface of the enamel at the margin of the gingivæ. If the deposit is removed, it will be noted that the crest of the underlying gingiva has been destroyed; there remains an inflamed blunted gingiva, instead of one with a very thin edge. The deposit has replaced the destroyed portion of soft tissue. If a larger deposit is removed, the soft tissue beneath presents a wider shelf of inflamed tissue; more tissue has been destroyed and replaced by the deposit. And so it progresses, destroying more and more; first the gingiva, next the gum tissue, the peridental membrane and the bone of the alveolar process. Finally so much is destroyed that the tooth becomes loose and is lost.

If at any stage in the progress of such a case, one will endeavor, after removing the deposit, to slip a thin blade between the remaining investing tissue and the root of the tooth, it will generally be impossible to do so, because the peridental membrane will be attached to the cementum right up to the level of the shelf of tissue. The deposit of salivary calculus does not, as a rule, cause the formation of a pus pocket along the side of the root. There are doubtless some exceptions to this rule; also some cases in which pockets have resulted from other causes, with a subsequent deposit



of salivary calculus. Salivary calculus should not, therefore, be considered a cause of the formation of pus pockets.

Deposits of serumal calculus on the enamel are a frequent cause of the formation of pus pockets. Clinically, we may divide the cases into two groups: First, those which present a general deposit in more or less complete rings about the crowns just beneath the gum margins, apparently the result of an overload of calco-globulin in all of the excretions and secretions, including the serum which keeps the subgingival spaces moist. Second, those which present localized deposits underneath the free gingivæ of one or more teeth in various positions, apparently due to a primary irritation of this tissue, causing an unusually large secretion of serum in the particular subgingival spaces. In either case, after an initial small deposit occurs, it becomes an irritant to the overlying soft tissue, causing the outpouring of abnormal quantities of serum, with relatively larger amounts of calco-globulin to increase the deposit. This inflammation makes possible the infection of this tissue and as we shall see later the infection may be carried into the peridental membrane by lymphatics which drain the gingivæ and eventually cause a break in the peridental membrane, thus forming a pus pocket.

The deposits of serumal calculus on the cementum are not to be considered a cause, but a result, of the formation of the pocket, for the simple reason that the detachment occurs in advance of the laying down of the deposit. We do not find deposits on the cementum in locations entirely surrounded by attached fibers. The material for the deposit is brought by the serum which is exuded by the inflamed tissue forming the pocket. It is of course recognized that a deposit once laid down on the cementum immediately becomes an irritant which contributes to the further progress of the destructive process.

Irritations of the gingivæ by food wedged between the teeth, by bad margins of fillings, ill-fitting crowns, etc.,

have long been recognized as a source of irritation to the gingivæ, which pave the way for infection and pus pocket formation, but the profession seems not to have taken these very seriously, apparently not recognizing the gingivitis as a necessary precedent to the pericementitis. Statistics<sup>5</sup> collected and reported six years ago indicated that possibly three-fourths of all those areas of gingivitis which might lead to pus pocket formation are due to some of the many forms of irritation of the above group.

In considering the statement that suppurative detachments of the peridental membrane from the cementum are permanent detachments let us review in order the tissue changes which take place. Some years ago it occurred to the writer that we should cut away some of the tissue forming a pocket and study it under the microscope to see what changes had occurred. Some time afterward a patient presented, wearing a partial upper denture; the tissues about all of the remaining teeth were diseased. In extracting an upper central incisor, the labial gum and alveolar process were cut through and removed with the tooth. Sections were made which included the root, peridental membrane, alveolar process and gum. This was in 1912, and was so far as we can learn the first attempt to study the tissue changes microscopically. Since then we have examined hundreds of specimens.

Let us refer to the studies of the lymphatics of the peridental membrane, as reported by Dr. Frederick B. Noyes, and also review certain points in the histology of the tissues which invest the teeth.

The cementum is built by the cementoblasts which lie on its surface, within the peridental membrane, between the fibers. The ends of the fibers are embedded in the cementum, the fibers passing across the peridental membrane to the bone of the alveolar process or to the gingivæ. The peridental membrane

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<sup>5</sup> *Transactions National Dental Association*, 1913, p. 141.



has an unusually rich supply of blood from three sources: vessels which pass through the gum tissue and over the crest of the process, vessels which enter the peridental membrane near the root apex, and those which pass through the alveolar process from the gum side to the peridental membrane.

It is important to note that the general course of all of these vessels within the peridental membrane is parallel to the long axis of the root, because Dr. Noyes<sup>6</sup> has demonstrated minute lymphatics attached to the walls of these vessels, which offer the most likely route of travel of infections involving the gingivæ. Dr. Noyes has pointed out that in cases of inflammation caused by deposits of salivary calculus the infection of the inflamed shelf of tissue appears to follow the lymphatics attached to the bloodvessels of the gum tissue on the outside of the alveolar process, while infections in connection with deposits of serumal calculus and other irritations follow the lymphatics attached to the vessels which course through the peridental membrane. This corresponds with our clinical observation that salivary deposits do not as a rule form pus pockets, while serumal deposits do.

We may summarize the succession of pathological changes as follows: There occurs an irritation of the gingivæ which permits an invasion by micro-organisms. We are not unmindful of the fact that the systemic condition may have so reduced the resistance of the gingivæ that infection may occur, apparently without a recognizable local irritation. The infection which penetrates the gingival tissue is taken up by the perivascular lymphatics and travels into the peridental membrane along the bloodvessel walls in a direction parallel to the long axis of the root. There occurs a thickening of the walls of the bloodvessels to resist infection, with final occlusion and obliteration of the vessel; there is an accumulation of round cells about the

lymphatics, and the surrounding tissue is later broken down in the form of a circle, or tube, about the vessel. This may occur along several parallel vessels until an actual break in the tissue occurs—a pocket is formed. There are then short ends of fibers attached to the cementum; the other ends are attached to the bone. The ends attached to the cementum gradually disappear, leaving the cementum denuded. The ends attached to the bone are absorbed or destroyed, as is the bone to which they were attached. Pus is formed and the denuded cementum becomes pus soaked.

Why do we say such a detachment of the peridental membrane from the cementum is a permanent detachment? First, because the cementoblasts and the fibers necessary to a normal reattachment have been destroyed, without prospect of renewal. Second, because the cementum is pus soaked, and would repel rather than attract those cells which might otherwise attach themselves to it, as in the case of an implanted tooth. Third, the denuded cementum is practically a piece of necrosed bone which cannot be exfoliated, because there is no circulation of blood in the cementum.

This completes our brief statement of the pathology.

#### TREATMENT.

The treatment commonly in vogue today has generally failed because all efforts have been centered on securing a reattachment of the tissue of the pocket to the dead cementum. We have persisted in attempting the impossible. Every imaginable medicament from the strongest acid, which we dared to employ, to the mildest antiseptic, has been tried; the soft tissues have been scarified and mistreated in every imaginable way; the cementum has been scraped until none remained; pulps have been removed with the belief that additional blood would flow into the peridental membrane and be of benefit; loose teeth have been held rigid with stay appliances; everything imaginable has been tried.

<sup>6</sup> *Journal American Medical Association*, 1918, p. 1179.

Many cases have improved so far as could be judged by clinical symptoms, most cases have apparently been temporarily benefited by almost any method which has reduced inflammation or cleansed the pocket; but in the long run, as viewed over a period of years and in the light of our present knowledge of the menace of these cases to general health, we cannot be proud of our achievement.

I have recently reviewed what little is published of the treatment employed by Dr. Riggs half a century ago. He devised a set of six scalers to remove deposits and he also trimmed off the crest of the bone of the alveolar process. The general opinion expressed by those who were familiar with his methods was that his cases did exceptionally well, yet the method seems not to have been used by more than a very few, and not extensively by them.

In recent years Dr. Riggs' treatment with various modifications has been revived by many operators. If we accept the statements made above relative to the pathology, the treatment indicated is quite simple. If the detachments are permanent, then our principal thought should be centered on means of prevention. Established lesions will do well if irritation is prevented and the pockets are kept clean so that they will not be re-infected. Only in a minority of cases in which pockets are shallow does this treatment suffice and it is an everlasting job—that is, as long as the tooth lasts.

The simplest method before us today is to cut away the overlying tissue and thus eliminate the pocket. If this is properly done, the epithelium quickly builds over the cut surface and the case is well within a few days. Your essayist has been following this plan since 1912. It is indicated in cases in which there remains sufficient attachment to hold the tooth firmly after the inflammation has subsided. It is not indicated where pockets extend within a few millimeters of the apex of the root. It is contraindicated in positions where the exposed root would be a disfigurement.

#### OPERATION FOR REMOVAL OF DETACHED TISSUE.

The operation is very simple. Novocain is injected. The detached tissue is cut away with suitable knives, the edge of the process is cut away, not because there is any evidence that it is diseased, but because the peridental membrane is destroyed in advance of the bone and unless the edge of the bone is cut away the pocket will not be fully eliminated. The cut edge of the gum is left a little higher than the bone to facilitate the building of soft tissue over the cut surface of the bone. Many cases have been so treated, the operation requiring possibly fifteen minutes, and the subsequent treatment consisting of irrigation with salt solution three or four times. Most of these cases have been kept under observation and many have required no further attention in several years. Others have required a second operation. In the long run of cases, this treatment is so much more satisfactory than the former method as to leave no room for comparison.

#### PREVENTIVE TREATMENT.

Finally, what may be done for prevention? We must constantly increase our effort to educate the public to the importance of proper mouth hygiene and to visit the dentist regularly for examination. The loss of teeth from deposits of salivary calculus can be prevented by proper brushing; it is purely a question of the patient carrying out the proper technique with his toothbrush. We must in our examinations carefully record every slight area of gingivitis, we must seek the cause of each area and whenever possible eliminate that cause. This treatment of areas of gingivitis must come to be considered of equal importance in the regular practice of dentistry with the filling of cavities in the teeth. The gingivæ must be regarded as offering a similar protection to the peridental membrane as does the enamel to the pulp. But not until the members of our profession understand clearly



that gingivitis always precedes pericementitis, that suppurative pericemental detachments are to be regarded as permanent and incurable, that pus pockets present a definite menace to health; not until we have it well fixed in our minds that we are preventing a case of pericementitis every time we clear up an area of gingivitis will we see our opportunity and do our duty.

122 S. MICHIGAN AVE.

[See also *Discussion*, as reported under "Proceedings of Societies," this issue.]

## Maxillo-Facial Surgery of the War as Applied to Civil Practice.

By ROBERT H. IVY, M.D., D.D.S.

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(Read before the Academy of Stomatology of Philadelphia, February 24, 1920.)

THE country and profession having practically returned to a peace basis, the principal justification for presenting a study of gunshot injuries at this time lies in the application of experience gained during the war to the treatment of certain surgical conditions arising in times of peace. When the war broke out surgeons were compelled to draw upon their experience with what they had seen of wounds, infections, and congenital and acquired malformations in civil life, and apply the same principles to war surgery. Owing to the prolonged course of the war and the tremendous number of casualties sustained, great impetus was given to the development of surgical methods, and many new procedures were introduced and still more which had been known previously were put upon an established basis. It now remains to apply this new knowledge gained during the war to cases in which it is applicable in civil life. I wish particularly to call attention to certain features of surgical treatment of maxillo-facial war injuries which may be of value in peace time cases.

In the first place, the greatest pos-

sible tribute is due to members of the dental profession for the important part they have played in the successful treatment of these injuries. Close co-operation between the surgeon and the dentist is essential not only in cases involving the jaw bones, but also in various injuries of the soft tissues of the face, the nose, the ear, and other parts. The surgeon who does not avail himself of all the help the dentist can give him is doomed to failure. The splints and appliances in the army cases shown here were designed and made by my associates at the Walter Reed General Hospital, Major Joseph D. Eby, and Captain Roy L. Bodine, of the Dental Corps. The construction of appliances, though extremely important, formed a small part of the work of the dental officers. Major Eby in particular was responsible for the entire problem of fixation in the fracture and bone graft cases and for the general care of sepsis arising from bone sequestra and dental lesions.

About ten per cent. of gunshot fractures of the mandible with loss of substance result in non-union or mal-union and require bone grafting for restoration



of function. Bone grafting in the mandible was occasionally practiced before the late war, but the cases occurred so infrequently that there was no basis for forming a prognosis in the individual case. Experience with numerous war injuries has established this as a definite procedure, with indications, technique and prognosis laid down as firmly as for almost any other operation in surgery.

#### METHODS OF RESTORING CONTINUITY OF THE MANDIBLE.

In a general way, three methods have been extensively employed in restoring continuity of the mandible:\*

(1) Pedicled graft from the mandible itself (Cole). A piece of the lower border of the anterior fragment is removed, leaving attached to it a pedicle of the digastric muscle and fascia below for nourishment. This is carried back to fill the gap and fastened to the fragments by means of silver wire. This form of graft is satisfactory in cases of loss of substance up to 3 cm. in the body or symphysis of the mandible. It is not applicable where the ramus is involved. The pedicled graft is not so vulnerable to infection as the free bone graft, and union will as a rule take place more rapidly.

(2) Osteo-periosteal graft (Delageniere). A thin shaving of bone is removed from the antero-internal surface of the tibia, the overlying periosteum remaining attached to the graft. One piece of this is inserted into pockets beneath the mandibular fragments, between the bone and the soft tissues, and another in a similar manner over the fragments, with the bony surfaces of the grafts facing each other. The osteo-periosteal graft is flexible, easily adjustable to the size and shape of the lost substance, and contains all the elements necessary for osteogenesis.

(3) Thick graft from tibia, rib, or crest of ilium. The writer prefers to

remove a piece of bone the full thickness of the crest of the ilium, cut to a size to exactly fill the gap between the mandibular fragments, and secured to the latter by means of silver wire. This method furnishes a graft that can be adapted to a small or a comparatively great loss of substance. It is especially suitable where immediate rigidity is desired, *viz.*, where too much dependence cannot be placed upon splints for fixation, and also for an immediate cosmetic result where the loss of substance has produced much visible deformity (Fig. 1).

The pre-operative treatment of all cases requiring bone grafting consists in removal of all sources of sepsis, reduction of the fragments, and fixation in such position that the normal occlusion of the teeth is restored.

We occasionally see in civil practice fractures in which a large loss of substance has occurred, resulting in non-union or mal-union. Another type of case is that in which a portion of the whole thickness of the mandible has been lost following necrosis or operative removal of a tumor. Such a case came to my notice during my service at Walter Reed Hospital. The patient had lost the entire right half of the mandible from the symphysis to the temporo-mandibular joint from necrosis following a dental infection. The patient had little or no control of the left half of the mandible, which was drawn over across the median line toward the left side, rendering mastication impossible and causing marked disfigurement. There was a deep concavity in the right cheek in place of the fulness normally due to the presence of the mandible (Fig. 2). The right alveolar ridge was represented by a band of scar tissue.

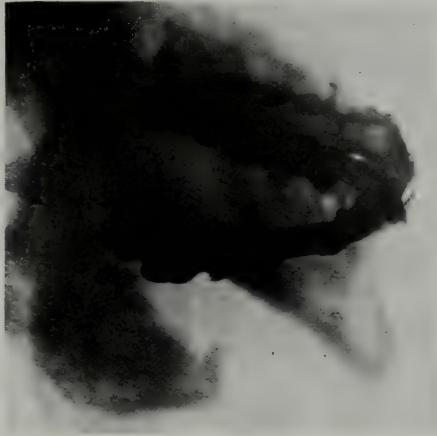
My dental colleagues prepared cast metal splints by means of which the remaining half of the lower jaw was held over in occlusion with the upper teeth of the left side. The splints had wide interlocking flanges on the left buccal surface which prevented the lower jaw from swinging over during mastication. The lost teeth and alveolar process of the right side were replaced by a vulcanite

\* For further details of bone grafts of the mandible see the writer's article on "Operative Treatment of Ununited Fractures of the Mandible" in *Annals of Surgery*, March 1920.

extension from the lower splint. Owing to the lack of a fragment of bone posteriorly, the ordinary bone graft operation was out of the question, for success in these cases depends upon attachment

border of the jaw, and a space burrowed in the tissues beneath the mucous membrane of the mouth from the symphysis back to as near the glenoid fossa as possible, care being taken not to open

FIG. 1.



A



B



C

A, Loss of substance of body of mandible; B, graft from crest of ilium in place; c, typical cast metal splint with lock pins.

of the graft to healthy bone at each end. However, it was felt that an attempt should be made to lessen the deformity produced by loss of the right half of the mandible.

An incision was made in the right cheek about the original site of the

into the mouth cavity. The end of the mandible at the symphysis was freshened and a strip of osteo-periosteum from the tibia, 10 cm. long and 2 cm. wide was placed in this pocket, in contact with the bone in front. In order to fill out the depression in the face, a piece

FIG. 2



A



B



C

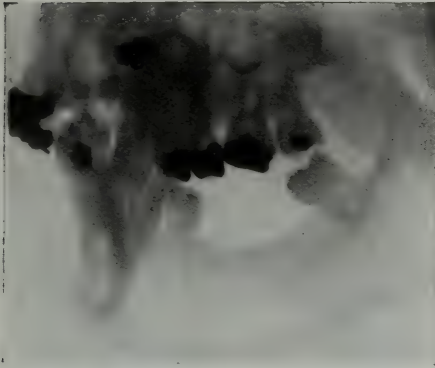
A, Loss of right half of mandible following necrosis; B, cast metal splints with interlocking flanges; C, after filling cheek depression with fat graft.



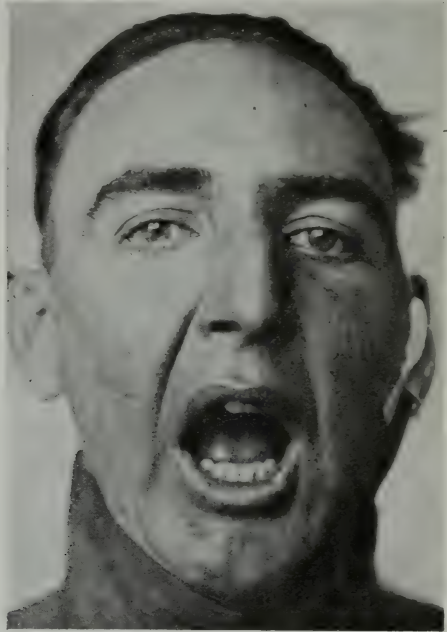
of subcutaneous fat from the abdominal wall of sufficient size to restore the normal fulness was then inserted over the tibial graft and the wound closed by

siderable bone formation in the right mandibular region and there is a much firmer alveolar ridge upon which to support an artificial denture.

FIG. 3.



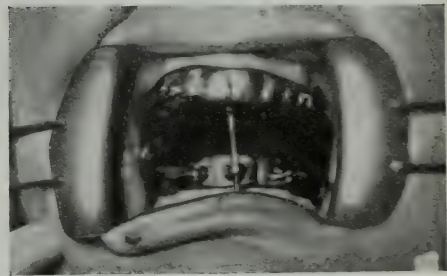
A



B



C



D

A, Ossification of masseter muscle due to shrapnel wound; B, after operation for relief of ankylosis; C, details of splints to maintain separation of jaws; D, splints in position.

suturing first to the fascia and then the skin. This patient of course continues to wear his flange, otherwise the jaw would swing over to the right, but greatly to my surprise, a radiogram made several months after the operation showed con-

I have under my care at present a young man twenty-seven years of age who, when seven years old, had a large portion of the left body of the mandible removed for sarcoma. He now has an absence of two inches of bone from just

to the left of the symphysis to the left angle, leaving a portion of the ascending ramus, which is freely movable, and drawn somewhat forward, upward and inward. He has been fairly comfortable and able to masticate imperfectly by means of a prosthetic appliance, but this no longer fits well and some of his remaining teeth are becoming seriously affected by the wear and tear. Splints are being prepared by Dr. Aiguier, and

of the mouth due to muscular contraction or cicatricial tissue. The majority of cases respond to gradual stretching by means of wooden wedges placed between the upper and lower teeth. In others this treatment must be combined with operative division of scar tissue, etc. In the patient shown, the outer side of the left angle of the mandible was struck by a piece of shrapnel, which did not cause a fracture but stripped the

FIG. 4.



A



B

A, Destruction of tissues of lower lip and chin; B, result of operation.

I hope before long to put in an ilium graft. Another case under way is that of a coal miner with a fracture with loss of substance the width of three teeth and union in bad position. His jaw will have to be divided, resplinted in proper position, and probably grafted.

#### TREATMENT OF TRISMUS ACCOMPANYING GUNSHOT INJURIES.

Many gunshot injuries of the face are followed by trismus or limited opening

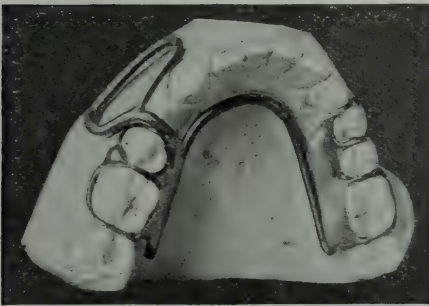
of the mouth due to muscular contraction or cicatricial tissue. This caused an abnormal growth of bone in the substance of the masseter, practically converting the muscle into an osseous mass, in this way greatly restricting the patient's ability to open the mouth. The radiograph demonstrated very well the ossification of the muscle (Fig. 3).

After unsuccessful attempts to separate the jaws by wedging between the teeth, the entire bony mass from the origin to the insertion of the masseter

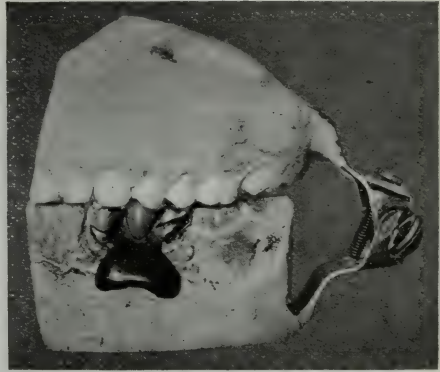
muscle was removed through an incision on the face. It was found that the outer side of the ramus had become united to the under surface of the zygoma by new bone formation, requiring division and removal of a portion of the zygoma before full separation of the jaws could be obtained. Shortly after the operation an appliance was inserted, consisting of splints cast in metal to fit over the anterior upper and lower teeth, the upper and lower portions being connected with springs and a jackscrew. The splints were not cemented, but were worn at all times by the patient except

from a revolver at short range, the bullet entering the face just below the right malar bone, traversing the masseter muscle on the right side and lodging near the base of the skull. After the wound had healed, the injury to the masseter muscle and possibly also the temporal insertion produced inability to separate the upper and lower teeth more than two or three millimeters. By gradual wedging with wooden blocks the jaws have been separated widely enough to obtain impressions, and an appliance similar to that described is being constructed.

FIG. 5.



A



B

A, Splint for supporting modeling compound and skin graft; B, permanent prosthetic replacement to pass into new sulcus.

at meals, and in this way recurrence of the contracture was prevented. The springs exerted a continuous pressure separating the jaws, while by means of the jackscrew a positive widening could be brought about whenever necessary.

This principle is now being applied to two cases in our clinic at the Evans Institute. One case is a fibrous ankylosis of the left mandibular joint of three years' duration, following typhoid fever, the patient being unable when first seen to separate the upper and lower incisors more than half a centimeter. Following a few weeks' treatment, she was able to have artificial dentures made.

The other patient received a wound

#### PEDICLE AND SLIDING SKIN GRAFT.

The principle of transference of pedicled and sliding skin flaps to cover defects of the soft tissues resulting from gunshot wounds has its application to the repair of similar defects seen in civil life due to loss of tissue from tumors. Fig. 4 illustrates the plastic repair of a gunshot defect of the soft tissues of the chin and lower lip by a pedicled flap of skin turned up at right angles, from the neck. This can just as well be done when the loss is due to a tumor provided the physical condition of the patient permits.

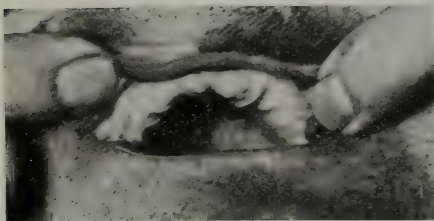
Occasionally, as a result of injury or



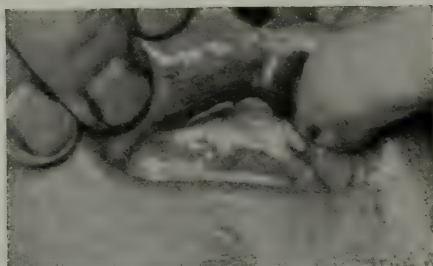
disease we see adhesions, by newly formed fibrous tissue, of the cheek or lip to the alveolar process, with obliteration of the buccal or labial sulcus and

always followed. The war has developed a new and successful method of dealing with cases of this type, largely through the work of Major Waldron, Major

FIG. 6.



A



B



C

A, Adhesion of upper lip to alveolar process; B, intra-oral skin graft; C, artificial denture in place.

consequent limitation of motion of the lower jaw and lips, or interference with the wearing of artificial dentures. Formerly this was treated by simple division of the adhesion, but recurrence nearly

Gillies and their colleagues at Queen's Hospital, Sidcup, England. These surgeons improved upon the original method of Esser which consisted in lining the raw surfaces of cavities with free skin

grafts supported on dental modeling composition.

In correcting a case of this type, the adhesion between the cheek or lip and the alveolar process is first completely divided as close to the bone as possible, thus producing a pocket with raw surfaces. An impression of this pocket is now made by forcing softened modeling

graft will have adhered to the raw surface, thus providing it with an epithelial covering and restoring the normal sulcus. Sometimes an artificial denture in vulcanite can be made before division of the scar tissue, the plate being carried up on the outside of the alveolar ridge by guesswork, and the plate bearing the skin graft wrapped over its edge inserted

FIG. 7.



A



B

A, Depressed scar of cheek; B, depression filled out with fascia lata graft.

composition up into the cavity. The compound is cooled, removed, and completely covered with a thin graft consisting of the outer layers of the skin taken with a razor from another part of the body, the raw surface of the graft facing outward. The compound, bearing the skin graft, is then placed in the pocket in the mouth, the raw surface of the graft being held in firm contact with the raw surface of the tissue. The compound is retained in place by a wire loop attached to a dental splint (Fig. 5).

At the end of several days the skin

immediately after division of the band of scar tissue (Fig. 6).

#### FAT AND FASCIA LATA GRAFTS.

Depressions in the surface of the face sometimes follow extensive loss of soft tissue or underlying bone from injury or disease. When extensive these depressions can be built out by subcutaneous insertion of abdominal fat or preferably fascia lata from the thigh. Fascia lata is more resistant to infection than fat, and is not absorbed so readily. The removal of the fat and fascia causes only

temporary discomfort and no subsequent disability. An incision is made in the skin over the seat of the depression and the skin freed from the subcutaneous tissues for some distance. The fascia is next divided and the tissues are undermined beneath this to create a pocket which, when filled, will slightly overcorrect the deformity. A piece of fat or fascia of sufficient size is then removed and inserted into the pocket, and the fascia of the face and the skin sutured in separate layers. Success is not so certain if the free transplant is placed directly beneath the skin. Figure 7 illustrates a case of fascia transplantation to correct extensive depression of the cheek following gunshot injury.

#### RESTORATION OF THE NOSE.

The war opened a wide field to the plastic surgeon in partial or complete restoration of the nose lost by gunshot wound. Civil life injuries by kicks, blows, falls, or burns, and destructive tumors, may cause defects of this organ which can be restored by similar methods. Early in the war prosthetic replacement of the nose was resorted to in numerous cases, the services of artists and sculptors being enlisted to give a lifelike appearance to the artificial substitute. But it was found that these pieces of facial camouflage did not withstand the test of time, and by the time American soldiers were ready for reconstruction, surgical methods had become so perfected that in our army not a single case presented that could not be fairly satisfactorily treated by rhinoplasty.

Figure 8 illustrates the case of a soldier who was shot with a machine-gun bullet which carried away the right eye and the bridge of the nose, leaving the lower cartilaginous portion of the nose intact. As the first stage toward restoration, a piece of the full thickness of the right sixth costal cartilage was implanted under the skin of the forehead. Three weeks later this piece of cartilage and the overlying skin were raised in the form of a pedicled flap, turned down and

sutured into the freshened edges of the nasal defect. The pedicle of the flap was at the inner side of the left orbit, and received nourishment from the angular artery. At subsequent minor operations under local anesthesia the redundant tissue caused by the folding of the pedicle was trimmed away and the edges of the flap readjusted to give the appearance shown in the illustration. An artificial eye was inserted.

The bridge of the nose is frequently depressed by falls and blows, giving the well-known saddle-nose appearance. This can easily be corrected by undermining the skin over the depression through a small horizontal incision between the eyebrows, creating a pocket extending from this point down to the tip of the nose, and slipping in a piece of costal cartilage suitably shaped to restore the normal contour. Another case is shown in Fig. 9 where the tip of the nose was carried away by a machine-gun bullet, leaving the alæ intact. This was restored by a flap turned down from the frontal region.

Nasal defects are not infrequently seen due to the ravages of epithelioma. Of course the advanced age of many of these patients renders them unsuitable for plastic operations, and it is here that artificial masks have their greatest usefulness. In the surgical restoration of defects of the lower portions of the nose, particularly the alæ, the dentist can render valuable aid in furnishing supports over which the surgeon can mold his flaps. These supports are usually attached to the upper teeth by means of a metal splint or bridge.

#### RESTORATION OF THE EARS.

Among the least satisfactory plastic restorations are those for repair of defects of the ear. Occasionally, however, fairly good results can be obtained. The case shown in Fig. 10 lost the upper portion of the pinna. At the first operation a piece of sixth costal cartilage, shaped to represent the lost tissue was buried beneath the skin of the scalp immediately beside the defect. Two



FIG. 8.



A



B



C



D

A, Loss of right eye and bridge of nose; B, insertion of costal cartilage under skin of forehead; artificial eye inserted after lower lid plastic; C, forehead flap with cartilage turned down and sutured into nasal defect; D, appearance after final trimming of flap.

FIG. 9.



A



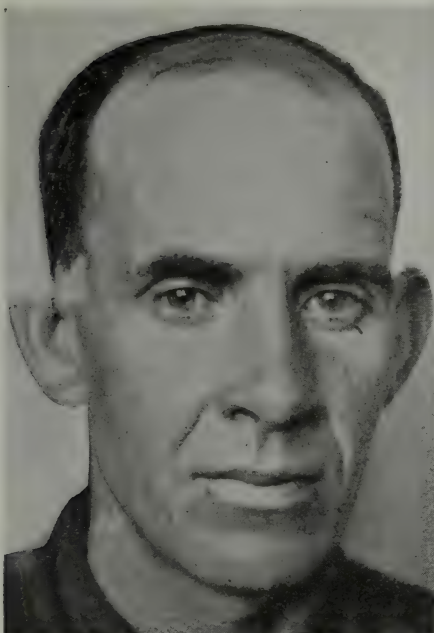
B



C

A, Loss of tip of nose, profile view: B, forehead flap turned down and sutured into defect; C, after operation.

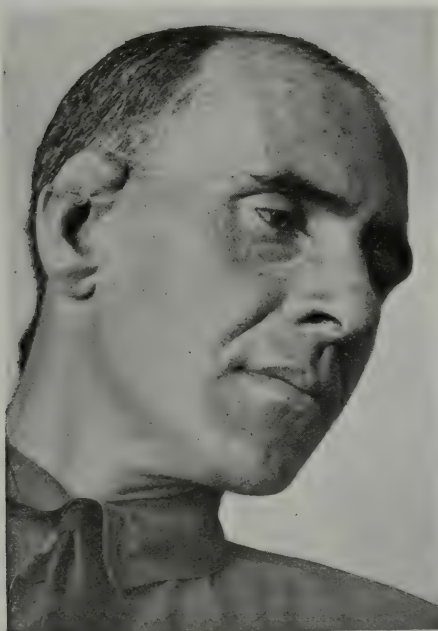
FIG. 10.



A



B



C

A, Loss of upper part of ear; B, insertion of costal cartilage under skin of scalp beside ear defect; C, scalp flap with cartilage raised and sutured into edge of ear defect; raw surfaces covered with skin graft.



FIG. 11.



A



B



C



D

A, Loss of left eyebrow and ear from burns of face; B, implantation of end of scalp flap into site of eyebrow (note temporary loss of hair); C, pedicle severed; D, after further trimming of new eyebrow flap, and application of artificial ear.

weeks later a scalp flap was raised, containing the cartilage, and sutured to the remaining portion of the ear. The raw surfaces at the back of the flap and on the scalp were covered with a free skin graft.

#### BURNS OF THE FACE.

Burns of the face offer a wide field to the plastic surgeon, and are not uncommonly seen in civil practice. They infrequently result in extensive thick scarring, of a keloid character, causing marked deformities of the eyelids, lips, nose, and ears. It is by a combination of surgery with massage, electro-therapy, X-rays and possibly radium that the best results are obtained. Sometimes after excision of the scar tissue a large raw surface remains which can only be covered by extensive flaps from the neck or elsewhere.

The patient shown in Fig. 11 sustained extensive burns of the face with complete destruction of the left ear and eyebrow. It was not considered feasible to attempt surgical restoration of the ear. A new eyebrow was made by taking a narrow flap from the edge of the scalp with its pedicle in the temporal region, the end of the flap being sutured into

the raw surface created by excising the scar tissue of the supra-orbital region. The hair covering the end of such flaps frequently falls out as seen in the illustration, but usually is replaced in time. Ten days later the distal end of the flap was severed from its connection with the scalp, and completely sutured in its new position. Several later readjustments were necessary, under local anesthesia.

The missing ear was replaced by a painted aluminum substitute made by my dental associates in collaboration with a sculptor, and this is doing very satisfactory service. The new eyebrow has to be kept well trimmed to match that of the right side. So encouraged is this man by the improvement in his appearance, that he has undertaken the study of medicine at one of our leading universities.

In conclusion, I will say that in work of this kind there are many disappointments, and successes that are only partial, but there is no type of surgery that is more gratifying to the patient or to the operator when we are able to produce a good result.

40TH AND SPRUCE STS.

## The Necessity of a Knowledge of Differential Diagnosis in the Therapeutics of Focal Infection.

By RAY R. REED, D.D.S.

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CASES are referred daily to the dental profession by physicians who wish advice regarding the possibility of the mouth as being a contributing cause to a certain systemic disorder. What is the usual procedure of the dentist? The dentist radiographs the teeth, advises the extraction of those which are abscessed and those beyond repair, and impresses the patient with the need of rigid prophylaxis. All he knows of the patient's systemic condition is that the physician has referred the case on account of rheumatism, nephritis or some other ailment of possible focal origin. His hopes are high when he discovers pathologic conditions in the mouth and he anticipates relief of symptoms soon after the removal of all infection. Time passes and no relief is evident. After several such failures the physician and dentist, both discouraged with the results, condemn focal infection as an etiological factor because of their failure to obtain the desired results.

Let us stop and analyze the situation. Can we not discover a panacea which will inhibit the over-enthusiasm of some and stimulate the skepticism of others into a constructive activity? We must arrive at a harmonious understanding whereby all bias will be lost in the efficient study and treatment of this great and new addition to science. What then is the solution of this problem? It lies in a careful study of the case and a thorough consideration of a differential diagnosis. Snap judgments are too often given in this line and they are the cause of many of the failures. We must ap-

proach a diagnosis from two different angles: (1) diseased mouth conditions as the primary factor in causing systemic disorders; (2) diseased mouth conditions as a contributing factor in causing subsequent illness. The former is active; the latter, passive. It is the former which is the question at hand and the one with which we shall deal primarily.

To make a careful and thorough study of the case in hand we must first of all have a complete record of facts of the case supplied us by the physician. This must consist of such tests as urinalysis, blood count, Wassermann reaction, and the results of the most rigid of physical examinations. Unless we are supplied with this information, which is a prerequisite to a correct diagnosis, we are diagnosing our cases on personal opinion. The enthusiast will diagnose any ache or pain associated with an infected mouth as of focal origin; the skeptic will incorrectly diagnose quite as many. The result is condemnation by both.

I wish to cite some examples of diseases in which the pains may simulate those of focal infection and which necessitate a very careful study and an understanding of differential diagnosis. The outstanding disease producing these symptoms is syphilis. Syphilis, which mimics all other diseases, should be borne in mind always. The fact that the patient shows a negative Wassermann is no indication that he has not syphilis. The majority of the patients receiving treatment at this clinic who have positive physical signs of syphilis have a negative Wassermann reaction. It is



only after the most careful and thorough investigation that a case can be diagnosed as negative. The pains produced by syphilis may be very easily mistaken for those of focal infection. Other conditions which bring about rheumatic pains are: gonorrhea, and spinal cord tumor. Pain in nerves and muscles, besides being produced by syphilis may be produced by tuberculosis, malaria and various tropical diseases.

Then there is the type of patient who comes with his case diagnosed by himself and wishes you to follow out the treatment he suggests. This is well illustrated in the case of an elderly man who came to me for an examination of his mouth. He said he had been suffering from "chronic indigestion" for several years due to his teeth. His physician had diagnosed his case as "chronic indigestion" and had treated him with the old-style methods and drugs. It should be borne in mind that any patient presenting such a story has some undetected trouble. Indigestion is not a disease in itself but a symptom produced by some other condition. This patient was referred to the medical department for a complete examination and his case was diagnosed as chronic cholecystitis with gall-stones. His infected mouth was probably the original cause of the condition, but it had finally manifested itself as a permanent pathological change in the gall-bladder. Had his case been diagnosed as due to focal infection, three people, namely, the physician, the dentist and the patient, would have decried the treatment and have joined the ranks of the "anti-focal infectionists."

There are also symptoms produced by such local infections as may gain direct entrance into tissues. I speak of such conditions as periostitis of the antrum, furunculosis of the external auditory meatus, secondary infection from an infected ingrown toe nail, nasal polyp, otitis media, adenoids, and infected lacerated everted cervix.

Foreign bodies in the ear, nose and bladder will cause pains which, when overlooked by the physician, will lead the dentist into an incorrect diagnosis.

Deformities, such as flat foot, obturator hernia, and supernumerary rib, produce pain and must be carefully considered in approaching a diagnosis.

Certain affections result in the formation of calculi, which produce pain and may be mistaken for focal infection pains. They are cholelithiasis, renal, ureteral, and vesicle stones, and should be eliminated by the physician.

These different diseases have been cited to bring out the importance of carefully considering other conditions as a factor in producing symptoms. Too often are infected mouths associated with pains or other systemic disorders diagnosed as the contributing cause, while any one of the preceding ailments is likely to produce pain in a region. It is obvious that a dentist, unfamiliar with these conditions, would be unable to reach a correct diagnosis. It is necessary then to co-operate with your physician and insist that a record of a complete physical examination be furnished with the case. The majority of physicians do not make complete physical examinations and it is in these cases that failures are met with. Group practice, with routine general physical examinations, is the most ideal method of successfully and intelligently treating cases of probable focal origin. When cases are dealt with in this manner the failures, so often heard and reported, will be diminished to a minimum.

The physician meets failures by lack of appreciation of mouth conditions and by treating symptoms and not removing the cause.

The dentist meets his failures by:

1. Incorrectly diagnosing cases, due to a lack of knowledge of differential diagnosis.

2. Treating the primary focus after a permanent pathological change is manifest.

It is indeed unjust to report failures and condemn the practice unless the case is studied carefully from every possible angle. Success is found in such a thorough study of the case; failures, in passing snap judgments and personal opinions not based on demonstrable facts.

The facts of focal infection are not altered by their interpretation. Faulty interpretation, be it due to over-en-

thusiasm or condemnation, is a result of ignorance of the biological laws involved.

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## The Oral Trench as a Means.

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By CHARLES C. SOUTHWELL, D.D.S., Milwaukee, Wis.

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UNTIL now and to this the present day," all home treatment of the gums, even at the direction of the dentist, has been quite exclusively confined to liquid preparations, usually those of a proprietary character. Regardless of merit the efficiency, function or office of these preparations has been modified, not only because of the need of dilution to a degree tolerable to the mouth generally, but more particularly because of the limited time in which they may be held in the mouth, even when diluted. Furthermore, in that respect and in view of the fact that the average length of time that the dilution is held being nearer one minute than two and during that time subject to further dilution by the saliva, it is reasonable to allege that the office of any prescription therefore necessarily and obediently approaches that of prophylaxis and toilet rather than an unerring treatment of the affected parts. In other words, it has been "the taking of the shadow for the substance."

This lack of precision and control led to the adoption of the retaining covers which are here illustrated and described and to which the writer has given the name of Oral Trenches.

In seeking a material for their construction attention at the outset was given to velum rubber alone and also in combination with ordinary vulcanite. This was promptly displaced, however, by the pink base-plate gutta-percha of the laboratory, because of its agreeable color and comparative ease of manipula-

tion; but above all for the reason that the modern stony casts serve admirably for such duplication as could occur. (Duplicates of velum demand a metal cast.)

Experiments were begun early in 1916 and in very incomplete form were presented in 1917 at the annual clinic of the Chicago Odontographic Society, but being comparatively crude small interest was shown. Shortly thereafter, as stated, a change in material was made to gutta-percha and through the co-operation of an interested manufacturer (Eugene Doherty, Brooklyn) the writer has been able to procure a thickness about seventy per cent. greater than that on sale in the dental depots. Further experimentation and clinical experience meanwhile encourages the belief that presentation to the dental profession is indicated.

Succinctly stated, the distinctive features of the trenches are as follows:

**OBJECT.** The precise application and positive confinement of the prescription *exclusively to the affected parts.*

**DESCRIPTION.** Speaking of the lower jaw, the trench is a reasonably thin gutta-percha cover made to fit each case by being molded on a cast over the ends and to the sides of the teeth and the gums to about one-eighth of an inch below the gum margin. (See details below under impressions.) The upper trench does not extend over the roof of the mouth and is therefore essentially the same as that for the lower jaw. (See Fig. 1.)



**FEATURES DETAILED.** The trenches provide positive control of medication; grant full dosage; prevent dilution by the saliva; grant prolonged treatment and permit the introduction of drugs that, ordinarily, are proscribed because of adverse or disagreeable effect on the tongue, mouth, throat and the alimentary tract. *Quidni abest?*

**INDICATIONS.** With pyorrhea heading the list the indications may be extended to recession, erosion and to the prevention, or at least to the checking, of the reaccumulation of tartar. In general prophylaxis—a distinct field—it is ap-

FIG. 1.



parent that with a prescription containing elements designed to emulsify the food plaques, the teeth are in effect "put to soak," if one may borrow from the laundry, thus greatly increasing if not absolutely perfecting the efficiency of the subsequent use of the toothbrush.

**PRESCRIPTIONS.** For obvious reasons no recommendations are offered, but in order that an elected prescription may be controlled it is imperative that it be reduced to a paste of a consistence not unlike toothpaste. This is clearly within the field of the pharmacist.

**HOW FILLED AND PLACED.** A small bone spatula serves admirably to freely line the trench, especially along the margin of the rim. If a reasonable excess has been provided an even distribution of the treatment is assured when the trench is pressed to place.

**WHEN WORN.** During an evening until the retiring hour, or all night, if indicated. In the latter connection two patients may be cited each having a

trench for the upper and lower jaws. One a physician with marked pyorrhea who, in the excitement of a night call in an accouchement case, rose hurriedly and was in attendance two hours before being made aware of the presence of the trenches, and then by the nurse mistaking them for "false teeth." Every tooth in this gentleman's mouth is firm, with the exception of the left superior lateral incisor. The other, a prophylactic case, being that of a discriminating lady who not only was not inconvenienced but who contended that she could not sleep without the trenches.

**IMPRESSIONS.** To speak frankly is to confess an embarrassment when the teeth are loose. Modeling compound is indicated in all cases and where the teeth are infirm or diverging or where underlocks exist as in bridge work one is obliged to fill all interspaces and underlocks with impression plaster before the compound impression is taken. This is best done with the finger tip, with which all excess may be removed during the setting of the plaster. Where the plaster has not been used the impression will show the interdental spaces, which should be cut out of the impression in order that the cast will be that of teeth without interdental spaces and which in turn provide, in the trench, a free runway for the paste.

**CASTS.** These should be of the more recent hard cast material and be preserved for duplications that may be required.

**MOLDING.** Take two sheets of the gutta-percha now on sale and press them together after being softened by dry heat. Roll or reduce to a thickness about twenty-five per cent. less than the combined thickness. Lay the blank on the ends of the teeth, immerse and mold in exceedingly hot water. If one is inexperienced in the molding of gutta-percha or if it is thought that it may be easily accomplished, it is hereby promised that the first attempt will be a failure. Neither must it be attempted with dry heat for the reason that the gutta-percha will adhere to and injure a dry cast.



Molding a limited section under a hot spigot and passing it, while so held, to the cold spigot, is a suggestion toward success.

Regardless of the care in which the trenches are molded very certain imperfections of fit will be noted on "trying them in," and to insure absolute accuracy *at the crucial point*, namely the rim margin, it may not be amiss to direct that a section of the *rim* on one side be softened to a discreet degree over the spirit flame and pressed to place after being replaced in the mouth. Repeat on the opposite side of the mouth. Then in front, and lastly, between the above three sections. Compressed air or cold water applied while the gutta-percha is being so held against the gums will expedite these steps.

**MISGIVINGS.** In the matter of prophylaxis especially the writer admits an interest amounting almost to concern for the adoption of the trench by the

dental profession. If at the outset they are advised too freely or if the dentist fails to raise the question within himself as to the ability of the patient to appreciate the advantages of the trench, to the extent of securing the intelligent co-operation necessary to bring about the possible results, an unfavorable rebound will doubtless follow. Or if it be thought that the trenches may be easily constructed and at a very nominal fee caution is again interposed for the reason that an inexpensive article is easily laid aside.

To favor a healthy growth of adoption it would be well to suggest or advise in moderation and then only in the direction of those whose discrimination and needs are such that the trenches will grow in favor along the indorsement route.

*Gutta-percha trenches, obviously, must be cleansed in cold water.*

141 WISCONSIN ST.

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## The Dentist's Part in the Cure, Control and Prevention of Disease.

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By N. J. PATTERSON, D.D.S., Albany, N. Y.

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**O**NE of the most important advances in the past few years in the healing art has been the development and recognition of the dentist's part in the cure, control and prevention of disease.

When we stop to consider for a moment that the dentist's field of operation covers the portal of entrance to the human body, it seems evident that he has a very important part to play in the department of health. Due to certain anatomical conditions, plus a lack of proper understanding of the importance of mouth hygiene by the public at large, the mouth becomes a very susceptible

spot for the development of pathogenic bacteria and their toxins. These, when taken into the system day by day, become a very important factor in the process of reducing the body resistance to such a point that secondary infection is possible, and make focal infection dangerous to life, no matter whether the real source of immediate infection is at the apex of a tooth, or in the genito-urinary tract, the tonsils or elsewhere. When secondary infection has been established the presence of mouth sepsis only continues to aid in lowering the body resistance, and is one of the most

important etiological factors which make secondary infection possible, not only to establish itself but to maintain its course to the end.

Since the theory was first advanced that localized low-grade infections, particularly of the teeth and tonsils, are responsible for many systemic disorders, the cause of which has long been a mystery, the average dental and medical practitioner today is beginning to realize that although a critical analysis of some of our literature on the subject of focal infections tends to show that in many instances definite deductions have been based on insufficient and inconclusive evidence, there is no question but that such focal infections are often the primary cause of serious functional and even fatal organic diseases.

It is now conceded by the pathologists that heart, joint, and kidney infections are largely of mouth origin. The isolation of the *Streptococcus viridans* from the hearts of individuals who have died from endocarditis has been conclusively proved by numerous observers. We know that the presence of the streptococcus is almost universal. It occurs in houses, in dust, on the skin, in milk and many foods.

From examination and study of the flora of the mouths of individuals from the period of eruption of teeth until adult life, it has been found that the streptococcus makes up practically fifty per cent. of the flora of the oral cavity. In the year 1915 the Bureau of Vital Statistics collected evidence to show that 105,202 people died of heart disease, while only 98,000 and some odd hundreds died of tuberculosis in all its forms.

With fifty per cent. of the flora of the mouth-growth given up to the streptococcus in normal individuals and with such a record of destruction of tissue and life there is something for us to consider in the control of this enormous growth, where it may be possible for these bacteria and their toxins to enter the blood and lymph streams by way of pyorrhea pockets and chronic dental ab-

cesses, thereby playing a leading part in the etiology of heart, kidney and joint infections.

The dentist sees two chief classes of patients, those who are in health and those who are ill. In the first class he has prevention of disease to consider, in the second class he has cure and control to consider, not only locally but from a general systemic standpoint as well.

In cases where the patients are in health it is the dentist's part to carry out all prophylactic measures coming within his field of operation both educational and operative.

In cases where the patient is ill it is the dentist's duty to look for causes and effects within the mouth and if either are found to endeavor to remove them. The recognition and removal of a focus of infection is imperative to prevent secondary disease and is demanded as a fundamental principle to stop the progress of ill health. In this way he may be able to cure or control disease in almost any part of the body as well as in his own field of operation. In all cases where the examination of the patient shows a need, the close co-operation of the dentist, physician and laboratory should be carried out, for it is only through such co-operation that the patient will secure the services to which he is entitled.

#### IMPORTANCE OF CO-OPERATION BETWEEN THE PHYSICIAN AND DENTIST.

The opportunity to prevent and cure disease presents itself as never before to the dental and medical professions. The intensive efforts of both professions to treat exclusively in their own field without regard to the professional inter-relationship has resulted in much harm. Dentists as a rule confine themselves strictly to their own field of operation and seldom investigate the general condition of the patient before beginning their treatment of the case. The day has passed when the specialist in any branch of the healing art can treat scientifically in his field without taking

into consideration the inter-relationship of functionation of all the body mechanism. I believe that a great many failures in both dental and medical cases are due to the lack of application of our present knowledge of the effect that disease in one organ or group of tissues may have upon other organs or groups of tissues in far distant parts of the body.

It is the dentist's duty in nearly all cases to carefully inquire into the general health of the patient before starting treatment; for right here he may find conditions which would contra-indicate certain oral treatments, such as devitalization or the conservative treatment of alveolar infection. A great many post-operative troubles may be avoided by taking into consideration information which can be gained by a proper examination.

It is the dentist's part to educate the public along the line of mouth hygiene and the dangers to their continued health that may arise from infected teeth and how to avoid these. A few minutes spent in this way at the time of examination will prove very beneficial to both patient and dentist.

Dental inspection of school children and the introduction of oral hygiene on

a much enlarged system would go a long way toward the cure, control and prevention of disease.

Dental internes in hospitals play a very important part in the handling of patients. For this reason I believe we as dentists should endeavor to see that such internships under the direction of a chief dental surgeon are created in the hospitals in our districts.

Aseptic conduct of our offices is absolutely necessary for the protection of the patients and ourselves.

Reporting to the health department of any venereal case which may present in our practice will aid very much in the prevention of the spreading of such diseases.

Dentistry today is a large problem and each man must decide for himself the proper method of handling each case which comes under his treatment, facing each problem in a very serious way, and clearly understanding that his decision may mean an early grave or a long life for his patient. Dentistry has been exalted to a position of the highest rank in preventive medicine and it is for each one of us to show that he is living up to that standard.

12 WASHINGTON AVE.

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## Vincent's Stomatitis and Associated Manifestations.

### A Report of One Hundred and Seventy-five Cases of Vincent's Stomatitis and One Hundred and Fifty-three Cases of Pyorrhea Alveolaris.\*

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VINCENT'S stomatitis is a specific inflammatory disease of the oral cavity, tonsils or pharynx. It may involve all of these parts, or be restricted to any one. It is caused by the action of the spirochete and fusiform bacillus first described by Plaut and Vincent. Pfaundler and Schlossman claim that the disease was first described by the Russians, Szimanowsky and Filatov. Clinically the disease may oftentimes be mistaken for either diphtheria or syphilis. Eichmeyer states that the fusiform bacillus and spirochete are always present but that other organisms may predominate. He also states that the disease belongs to the same group as ulcerative stomatitis, as shown by a similarity of clinical and anatomic findings, and that Vincent's stomatitis may begin as an exudative stomatitis and continue as a typical ulcerative stomatitis, and may extend to the fauces. He concludes that not only are Vincent's stomatitis and ulcerative stomatitis identical in their etiology, but that noma or gangrenous stomatitis is caused by identically the same organisms. The spirochete and fusiform bacillus are found in one-quarter of the cases of diphtheria, and are less frequently found in scarlatina, gingivitis marginalis, stomatitis varicellousa, parulis and morbus maculosus Werlhofii. Eichmeyer further states

that the spirochete and fusiform bacillus are found before the teeth are present.

In the March *Bulletin* (1918) of the Canadian Army Medical Corps, Major F. B. Bowman points out that if Vincent's name deserves to be associated with this condition the title Vincent's disease should be employed rather than the familiar but erroneous term Vincent's angina. Vincent's disease plays a very important part among the number of suspected throats sent for bacteriological examination; thus among two hundred and fifty-five such cases, Deglos detected fifty-one, or approximately twenty per cent., usually in soldiers between the ages of eighteen and thirty years. These cases were generally associated with large and more or less crypt-laden tonsils and with bad teeth. The activity and prevalence of the disease is greatest in the spring and fall of each year.

Beyer, a dental surgeon, who examined over two hundred cases of pyorrhea alveolaris in the course of a few months found a fusiform bacillus and spirochete present in each case and concluded that pyorrhea alveolaris, Vincent's disease, ulcerative stomatitis, and noma are all caused by the symbiosis of Vincent's fusiform bacillus and the spirochete. Many of Beyer's cases involved both the gums and throat.

\* Published with permission of the Surgeon-General, U. S. Army, who, however, is not responsible for any opinions expressed or conclusions reached herein.

Kolle, in examining ninety cases of pyorrhea alveolaris, found a spirochete 10-15  $\mu$  in length, usually presenting five convolutions and resembling the *Spirochaeta buccalis* and which he calls the "*Spirochaeta pyorrhoeica*." In most of his cases the organism was in pure culture, but in many cases there were, in addition, the spirochetes of the normal mouth as well as Vincent's organisms. Beyer regards the destruction of the outer surface of the alveolar process around the margin of the teeth (atrophia alveolar praecox) as of primary etiological importance, whereas Kolle holds this action as secondary. Between December 8, 1916 and January 4, 1917 Schimomi and Meckler, on duty in the second Turkish military hospital at Jerusalem, examined seventy-seven cases of ulcerative stomatitis and pharyngitis; seventy-four of these cases were positive for Vincent's organisms.

#### NOMENCLATURE AND PREVALENCE.

Vincent's stomatitis is the recipient of a wide and varied nomenclature. Some of the common titles are as follows: Vincent's Angina, Trench Mouth, Ulcerative Stomatitis, Pseudo-membranous Angina, etc. Previous to this war the disease, although quite prevalent, was not so common. When armies were mobilized and men forced to live in close contact with one another, under conditions which were neither sanitary nor hygienic in spite of all efforts to make them so, the virulence and prevalence of the disease increased proportionately. The disease would frequently make its appearance in fighting units "on the line" as well as among troops in the rear. The soldiers' habit of drinking from each others' canteens no doubt was a very important factor in spreading the disease. Lack of facilities for attending to the daily hygiene of the mouth was also greatly aggravative to the tissues for the inroads of infection.

*Of one hundred and seventy-five cases of stomatitis coming under my care, each and every case contained the spirochete and fusiform bacillus, and of a total of*

*one hundred and fifty-three cases of pyorrhea alveolaris examined, each and every case presented the identically same organisms in mixed culture. Relatively speaking, the number of cases of Vincent's stomatitis treated appeared in approximately ten per cent. of the bed capacity of this hospital! Therefore, from experience gained with the disease among combat troops in the field and in the hospitals, I would urgently recommend that these cases be isolated the same as other infectious diseases are, and the customary precautions taken as regards eating utensils.*

#### CLINICAL APPEARANCE AND SYMPTOMS.

The symptoms and lesions produced are both pronounced and characteristic. They may be described as follows: (1) Soreness and bleeding of gums on slightest provocation; possible enlargement of cervical lymphatics. (2) Fetid odor of breath. (3) "Rusty" or bloody sputum in the morning, sometimes noticed by patient on pillow cover, due to salivation. (4) Swollen gums, presence of small ulcers with formation of membrane over same. (5) Malaise. (6) Impairment of mastication of food. (7) Secondary involvements.

The systemic or secondary involvements that may be present depend entirely upon the length of duration of the disease, the virulence of the organisms and the general resistance of the individual.

The disease is generally confined to four general locations, namely: (1) The gingivæ. (2) The buccal mucous membrane. (3) The hard and soft palates. (4) The fauces.

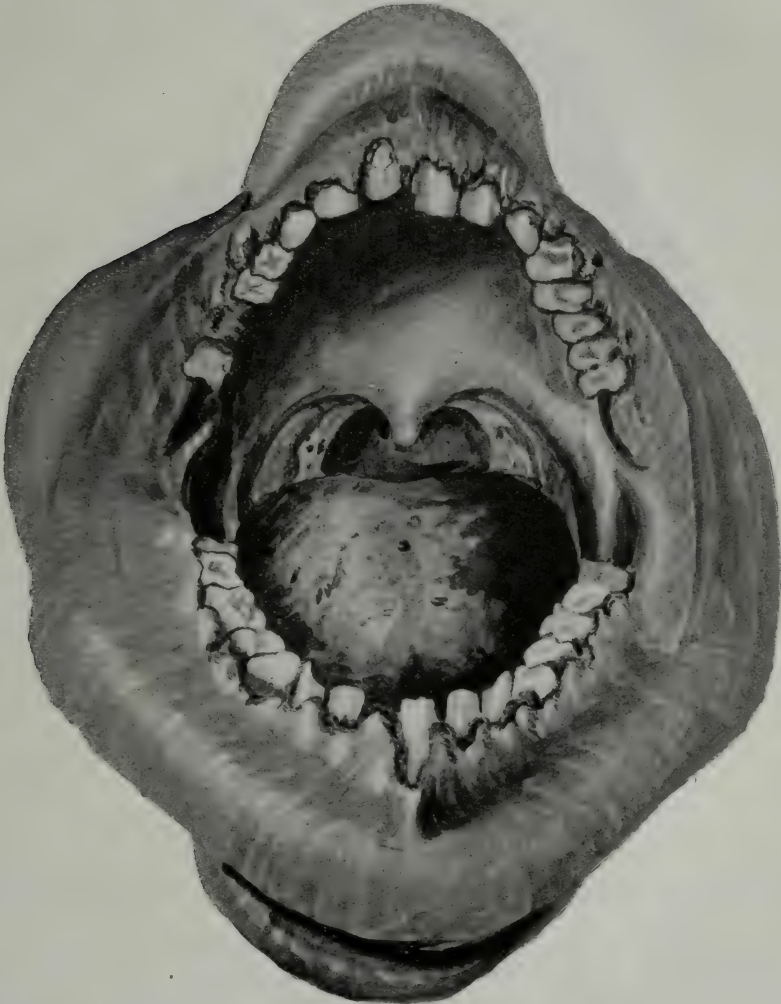
In the majority of cases the disease is found to involve two of these general locations at the same time, as for example, the gingivæ and buccal mucous membrane or the fauces and either hard or soft palates, and from these locations of the disease which should be clinically called Vincent's stomatitis, it can be subdivided into Vincent's gingivitis, Vincent's tonsillitis, etc.

## THE ORGANISMS.

The lesions contain numerous types of bacteria in mixed culture, and characteristic of this disease the spirochete and

slender organism with tapering or slightly pointed ends, slightly swollen in the middle and consequently referred to as a spindle-shaped bacillus. It is non-motile and does not stain by Gram's

FIG. 1.



Illustrating involvement of gingivæ with ulcer on and adjacent to the tonsil.

fusiform bacillus are always present. The virulence of these organisms is tremendously increased by persons living in close quarters under unsanitary and unhygienic conditions.

The *Bacillus fusiformis* is a long

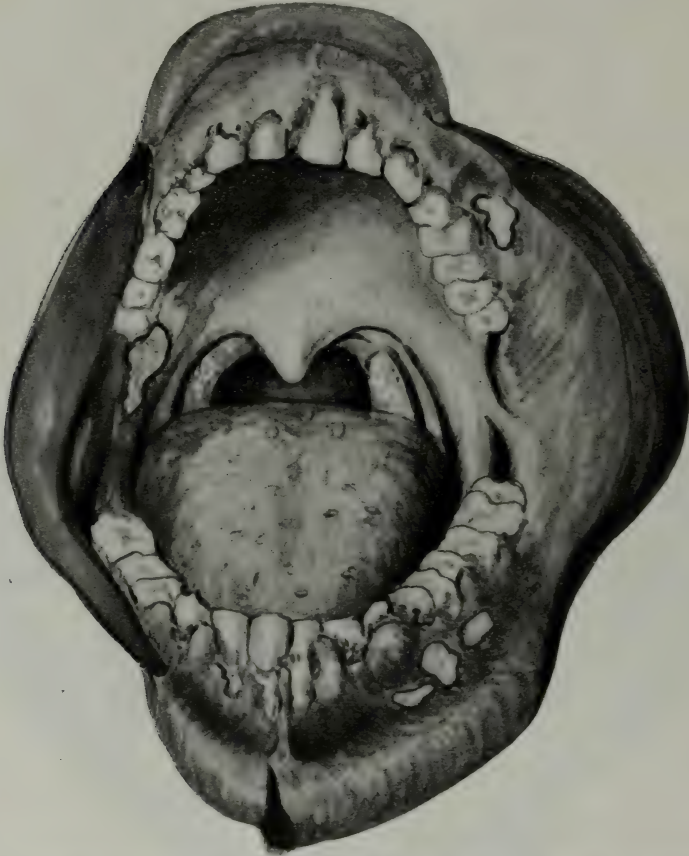
method. With methylene-blue it stains unequally and gives a granular appearance, and in fluid media under anaerobic conditions the growth is flocculent and whitish in appearance. Neither in fluid or solid media are the cultural features



especially characteristic. A distinctly foul odor is present, but according to most observers there is no formation of gas bubbles in glucose agar. The spirochete from smear preparation is very

associated with each other in some sort of symbiotic relationship. However, evidence exists in favor of the view that these organisms are simply different phases in the life-cycle of one organism.\*

FIG. 2.



Illustrating involvement of gingivæ in conjunction with ulcers on the buccal mucous membrane.

delicate, and is much smaller than the organism found in syphilis; it is exceedingly motile and its undulations are less pronounced than those of this organism found in syphilis. It stains faintly with Loeffler's methylene-blue. All attempts to grow either organism separately have failed completely. Some investigators have followed the theory that the fusiform bacillus and the spirochete were two distinct organisms closely

#### PREDISPOSING AND EXCITING CAUSES OF INFECTION.

After passing over the evidence at hand, which tends to convert one to the fact that Vincent's stomatitis is caused by a specific organism which opens the primary lesion, we shall now consider

\* RUTH, TUNNICLIFFE. *Journ. Inf. Diseases*, 1919, 3, p. 148.

some of the more important predisposing and exciting causes which make possible a successful bacterial attack. They may be enumerated as follows: (1) General neglect of oral hygiene. (2) Faulty crown and bridge work. (3) Poorly

posing the dentin. Aside from the local manifestations of sensitiveness to thermal changes, we find bacterial action setting in on this organic tissue, which affords the organism an excellent nutrient media. The bacteria work on,

FIG. 3.



Illustrating involvement of gingivæ with typical ulcer on the hard palate.

inserted fillings. (4) Traumatic malocclusion.

#### ORAL HYGIENE.

General neglect of oral hygiene will give rise to the following phenomena: Food deposits which are collected, will ferment, thereby forming lactic acid, which in turn generally dissolves the calcium salts of the enamel, thereby ex-

giving extension to the caries in their work; for as they live at the expense of the dentin, so must this structure suffer from harboring the unwelcome invader. Every cavity so formed as a result of wanton neglect will serve to collect more food débris which in turn accommodates so many more bacteria, which in turn lower the vitality of the adjacent tissues, and make the probability of an

infection so much more possible. The possibility of success of any pathogenic organism depends upon its virulence as compared to the resistance of the defendant.

#### FAULTY CROWN AND BRIDGE WORK.

That which holds true of the part played by carious teeth acting as débris collectors also holds true of faulty crown and bridge work.

#### POORLY INSERTED FILLINGS.

Poorly inserted fillings, especially those along the gingival margin which act as traps for the débris, give rise to the same result mentioned above. Fillings which fail to restore the contact point fall under the same class.

#### TRAUMATIC MALOCCLUSION.

By traumatic malocclusion, it is not the intention to convey the idea of simple malocclusion. The traumatic malocclusion we have in mind is in those cases whereby the teeth, aside from not being in normal occlusion, exert such an abnormal pressure on their opponents that the resultant force therefrom gives rise to pathological changes in the investing and supporting tissues of the teeth. Vincent's organisms seem to be exceedingly partial to undermined tissue for their growth.

#### DIAGNOSIS.

Every case suspected of Vincent's stomatitis should be subject to a differential microscopical examination. A smear should be obtained from the lesions with a fine silver probe and applied to the glass slide. One should be careful to spread this material over the slide thoroughly so as to avoid getting too thick a specimen. The slide is then gently dried and stained with Loeffler's methylene-blue. The specimen is then washed and dried, mounted on the microscope, and examined with oil immersion lens. If the specimen is positive the spirochete will appear much

fainter in color than the fusiform bacillus. The spirochetes will be seen to form an irregular network through which the fusiform bacilli will be found. An excellent confirmatory test is to mount a specimen from the same lesion in a "hanging drop preparation" and examine it by means of the "dark field." By this method one can study the spirochetes both in motility and relative numbers present. The microscopical examination by both of these methods not only checks up the clinical diagnosis of Vincent's stomatitis, but in case these specimens prove to be negative it affords opportunity to determine whether or not diphtheria or syphilis is present. The former can be diagnosed by means of Loeffler's methylene-blue and the latter by means of the dark field.

#### CLINICAL PICTURE AND DETAIL.

When the average patient is examined and the diagnosis of Vincent's stomatitis is confirmed the history will read as follows: The gums are inflamed, swollen, very sore and bleed easily. Patient generally complains of headache, backache, and nauseated feeling in the stomach, which is due to an impairment of proper mastication of food, and secondarily to the swallowing of septic material from the mouth. On close examination the gum margins are edematous and a distinct pyogenic discharge is present. The teeth are generally quite responsive to the slightest percussion, and the breath presents the characteristic fetid odor. The disease may be limited to the gingivæ or may also be present on the buccal mucous membrane which is generally located opposite either the second or third molar tooth of either jaw. The ulcers are covered by a grayish pseudo-membrane which is formed by a necrosis of the superficial layers of the mucous membrane. However, this typical picture is not constantly present, for in some cases the ulceration may only be superficial while in others the ulceration may be very deep-seated. In many cases the large ulcers will be observed on either



the hard or soft palate, usually the latter; also on and surrounding the tonsils. In cases of tonsillar involvement the cervical lymphatic chains are usually engorged from the disease. In cases involving the tonsils and which present engorged lymphatics the temperature is invariably above normal, generally reaching its highest point about 4 P.M. daily.

#### TREATMENT.

Kolle, Beyer, Schimomi and Meckler, and Deglos recommend neosalvarsan locally and intravenously, but except in any severe cases Schimomi and Meckler rely on the vigorous application of a concentrated solution of permanganate of potassium combined with tincture of iodine. Deglos employed frequent applications of a solution of methylene-blue and silver nitrate. He also used neosalvarsan locally in the form of a powder or suspended injections. Both his methods gave good results, the latter being especially rapid.

Fowler's solution has been used by many. This method consists in applying the following solution to the affected parts two or three times daily:

R—Vinum ipecacuanhæ, cc. xvj  
Glycerini, cc. iv  
Liquor potassii arsenitis, cc. xxxij

Some of the other prescriptions used successfully by members of the profession are as follows:

R—Potassii permanganas, gr. xiv  
Aqua dest., q.s., f3 vj

M. Sig. Tablespoonful to one-fourth glass of water as a mouthwash every two hours.

R—Medicinal methylene-blue, gr. vij  
Grain alcohol, f3 j

M. Sig. Teaspoonful in quarter glass of water as mouthwash every two hours.

R—Methyl-violet, gr. vij  
Grain alcohol, f3 j

M. Sig. Same as above.

TREATMENT AT U. S. A. GENERAL HOSPITAL NO. 41, FOX HILLS, STATEN ISLAND, N. Y.

I shall now describe in detail the method of treatment inaugurated by me

at this hospital for the treatment of Vincent's stomatitis and pyorrhea alveolaris, it being identically the same in each case.

First of all it is necessary to know that the gastro-intestinal tract is functioning normally, if not it is proper to rectify this by prescribing a suitable laxative, preferably one ounce of magnesium sulfate to be taken one hour before breakfast. The next step is to get rid of all carious roots and ill-fitting crowns. Removal of calcareous deposits is next attended to and a good prophylaxis of the oral cavity is carried out. Our next step in treatment consists of a thorough spraying out of the entire oral cavity with a good antiseptic and soothing mouthwash, preferably the following which is diluted one-half with water:

R—Potassium bicarbonate,	gms. 32
Sodium borate,	" 8
Ol. menthol piperitæ,	" 0.1
Eucalyptol,	" 2
Phenol,	" 3
Alcohol,	" 60
Glycerin,	" 100
Aqua,	q.s. ad. " 1000

Sig. Equal parts with water as a mouthwash.

We are now ready to proceed with our local treatment which is carried out daily until the patient is discharged as cured, which is determined by a negative slide for both fusiform bacilli and spirochetes. It is most important to bear in mind the fact that the gums and all involved parts, including previous lesions, will long have cleared up and present an exceptionally excellent appearance, *but the patient should never be discharged as cured until a negative slide is obtained, thereby obviating a recurrence.* We next use a twenty per cent. solution of copper sulfate in the spray bottle. The adjustment is regulated to a needle-point spray and at the first treatment the full twenty per cent. solution is used. At subsequent treatments half strength of the copper solution is used. The entire oral cavity is sprayed, particular attention being directed to the gingival margins and ulcerous formations. The patient

is instructed to hold this solution in the mouth for five minutes and then expectorate same. Patient should be warned against swallowing any of the solution, as it will act as a powerful emetic if taken internally.

Copper sulfate is an astringent, and astringents being closely related to caustics and antiseptics their difference in action is largely a matter of degree depending on their concentration. Copper sulfate, seemingly being the most ideal astringent for treating this disease, acts on the inflamed mucous membranes, contracts superficially located blood-vessels, reduces edema and swelling. Deducting from the results obtained in the treatment of cases herein reported, the author is prone to believe that copper sulfate has an unexplained specific action. As a therapeutic agent in the treatment of Vincent's stomatitis and pyorrhea alveolaris, I believe it has no equal. Incidentally it might not be out of place to mention the fact that copper sulfate in solution 1:500,000 is used to sterilize water for drinking purposes. Having completed the copper treatment we proceed with the application of arsphenamin. The prescription that we have found to be most efficient is as follows:

R—Arsphenamin,	gms. x
Petrolatum,	" xc
Sig. Use as a massage locally.	

In preparing this prescription it is very important that the ointment or salve is put in a dark brown glass jar, which protects it from exposure to the rays of direct sunlight. If this precaution is not carried out, it will readily decompose as a result therefrom. In applying this salve it is recommended that the operator use a rubber glove on his right hand. A reasonable amount of salve is taken preferably on the index finger and gently, though thoroughly massaged into the tissues. The patient is instructed to report daily for this treatment, and is given a mouthwash for daily use, as follows:

R—Zinc sulfate,	gms. iv
Glycerin,	" viij
Aqua menth. pip., q.s. ad.	" lx

Sig. Teaspoonful in tablespoonful of water three times daily as a mouthwash.

This wash has proven to be a most valuable assistant in treatment if continuously carried out.

In those stubborn cases of Vincent's stomatitis and pyorrhea alveolaris which apparently need some therapeutic agent capable of "breaking its back," the author highly recommends the intravenous administration of arsphenamin. Before proceeding with this method it is most important that a thorough cardiac examination be given the patient. This is necessary in order to avoid any unexpected cardiac or renal reaction. Sugar and albumin are contra-indicatory signs for intravenous administration of arsphenamin.

#### METHOD AND TECHNIQUE OF INTRA- VENOUS ADMINISTRATION OF ARSPHEN- AMIN.

The preferable type of syringe to use for this work is a two-piece glass one. It is desirable to have several of these, which after being boiled should be immersed in an alcohol bath.

The capacity of the syringe should be about ten mils, and the barrel long and slender, so that it will not be an obstacle when working at acute angles. A flask containing sterile water should be close at hand. The operator wearing sterile rubber gloves adjusts a needle, approximately five centimeters in length and a trifle thicker than an ordinary hypodermic needle, to the syringe. The syringe is then replaced in the alcohol bath. Next an ampule containing .9 gram of arsphenamin is gently flamed in the alcohol burner and the end filed off. Four mils of sterile water is next drawn into the syringe which in turn transfers it to the ampule containing the .9 gm. of arsphenamin. The arsphenamin readily goes into solution and is then redrawn into the syringe. Our dosage being ready for administration,



we next proceed with the preparation of the patient. Patient is placed in a reclining position on the table, the left arm being supported by a plank extending out, which allows the arm to be flexed. A piece of ordinary tubing is drawn tightly around the upper arm, the object of which is to engorge the veins with venous blood, which facilitates the "picking up" of the veins. The antecubital fossa is next scrubbed with alcohol and then thoroughly covered with tincture of iodine seven per cent. The veins will be observed to be standing out prominently and it is most desirable to use the median basilic vein for the injection, because of its size. The skin is pinched up on each side of the vein and the needle is introduced in the general direction of the long axis. As soon as the first trace of blood appears in the syringe it is time to start the injection. When the injection is started the rubber hose tourniquet is released. The injection must be made very carefully and slowly. If the solution is administered too rapidly the patient will experience a severe burning sensation in the immediate location. After completing the injection apply iodine to the puncture.

#### CAUTIONS IN INTRAVENOUS INJECTION.

1. Do not inject air into a vein.
2. Do not puncture both walls of the vein.
3. Be sure that the injection is being made into the vein, for if it is going into connective tissue, it will be followed by a severe inflammation, pain and slough, in which case it will be necessary to open surgically and drain. The intravenous injection of arsphenamin is given once every four days using .9 of a gram and continuing the local treatment as previously described in conjunction.

From experience gained in treating the cases of Vincent's stomatitis and pyorrhea alveolaris herein reported, I would say that the average time to obtain an apparently perfect result ranges from ten to fifteen days.

#### BACTERIOLOGICAL PICTURE.

1. In the examination of a case of Vincent's stomatitis that has just recently developed, the microscopical picture presented will read as follows: (a) Numerous fusiform bacilli; (b) not so many spirochetes.

2. If the case is one in which the disease has about reached the zenith of its activity the microscopical picture will be as follows: (a) Numerous fusiform bacilli; (b) numerous spirochetes.

3. If the case is put on treatment, after a period of two or three days the microscopical picture will be as follows: (a) Very few fusiform bacilli; (b) big decrease in spirochetes.

4. After continued treatment, bacteriological picture presented will be *negative*. This result will be in keeping with the apparently perfect condition of the soft tissue appearance.

#### CONCLUSIONS.

From a careful microscopical study of the cases that have been under my care for treatment, I wish to emphasize the fact that the foregoing microscopical pictures are of the greatest importance in studying the progress of the disease. I am not only convinced that the spirochete and fusiform bacillus is the specific etiological factor in the disease, but also that the fusiform bacillus is simply an embryonic phase in the life cycle of the development of the spirochete. These conclusions are reached as a result of experience, as stated by the facts herein. The treatment of pyorrhea alveolaris is identically the same as that described for Vincent's stomatitis. No root surgery is practiced. The bacteriological findings in both diseases have been parallel. As a result of study of urine specimens from patients suffering from pyorrhea alveolaris, I have concluded that general systemic disorders, such as chronic kidney disease, etc., do not bear any appreciable relationship to the disease. Also that the toxins of the spirochete and fusiform bacillus of Vincent, do not in any manner influence a Wassermann reaction. In concluding I wish to point out that



Vincent's stomatitis, if allowed to pursue its course without proper treatment, will cause bone destruction, form characteristic pockets, and result in eventual loss of the teeth in the same manner as is found in cases of pyorrhea alveolaris, although more rapidly. This, in the author's opinion, is due to a greater virulence of the strain of the organism involved.

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## Histo-pathology of the Jaws and Apical Dental Tissues.

### No. XII:

#### Interstitial Gingivitis and Pyorrhea Alveolaris.

By EUGENE S. TALBOT, M.D., D.D.S., Chicago, Ill.

(Continued from page 719.)

MY researches on inflammation of the gums, alveolar process and peridental membrane were begun in the year 1878 and have been continuous up to the present time. The work was performed upon animals and humans. All work was done with the microscope and, therefore, all researches and reports are based upon microscopical findings. The first article was published in the DENTAL COSMOS in 1886 and since that time more than forty articles under different subjects in different dental and medical journals and two editions of "Interstitial Gingivitis" have appeared. A series of articles upon "Histo-Pathology of the Jaws and Apical Dental Tissues" beginning with the May, 1919, DENTAL COSMOS have appeared from month to month up to the present time.

#### MATERIAL USED.

The healthy jaws and teeth of normal animals and humans were used. In

addition the jaws of individuals suffering from diseased conditions, such as Bright's disease, diabetes, rheumatism, gout, arteries undergoing degenerative changes, cardio-vascular diseases, skin eruptions, asthma, scurvy, rickets, pellagra, syphilis, drug and metal poisons, indigestion, auto-intoxication, and many other systemic conditions were also studied. Researches upon dogs in malnutrition and faulty metabolism were also observed. The object of all of this work was to find the etiology and pathogenesis of the disease generally called *Pyorrhea alveolaris*. In the early years, this work was performed under the guidance of the ablest pathologists, bacteriologists, and chemists in Chicago, who were ever ready to assist me in the many years of study.

Two causes for the disease of the gums, alveolar process and peridental membrane were found; first, those due to bacterial invasion, and second, those due to irritation consequent to diseases of metabolism. Disease of the gums

resulting from infection is seen in trench fever, Vincent's angina, actinomycosis, syphilis, gonorrhea, and similar conditions, and is readily recognized by the profession. Although the pathology is the same, the infectious diseases are not considered in my researches. The second group, those due to local and constitutional irritation which are found especially in conditions of malnutrition, faulty metabolism, anemia, and auto-intoxication, have interested me from the first. In general the non-bacterial causes of gum and jaw disease may be divided into local and constitutional.

#### LOCAL CAUSES.

The local causes are all irritants about the gum margin and are familiar to all dentists. These irritants cause irritation and inflammation, which begin at the gum margin and pass through the periodontal membrane and alveolar process. Before inflammation occurs bone absorption in the alveolar process first takes place, as has been shown in a former work.<sup>1</sup> Recession of the gums cannot occur until after bone absorption has been produced. This process may be called *Gingivitis*.

#### CONSTITUTIONAL CAUSES.

Metal, drug and autotoxic poisons circulating in the blood find their way to the alveolar process and become stagnant, irritate the tissues, cause bone absorption, then inflammation, just as in the first group, except that other parts of the alveolar process are just as liable to become involved as the gingival border, hence the term *Interstitial Gingivitis*. In both cases stasis of blood occurs and nutrition is cut off with resultant bone absorption.

Diseases producing malnutrition and faulty metabolism are fruitful sources and frequently cause the greatest destruction of the alveolar process with or without inflammation of the gums, peri-

dental membrane and trabeculæ. No one has been able to produce the disease by infection and I have always taken the ground that it is not an infectious disease.

Virchow in his lectures many years ago brought out the fact so strikingly that the body is essentially a collection of cells, and that upon the proper performance of function by the individual cells its health and well-being depend, is often forgotten by the average dentist. So also is the corollary that disease represents disturbance of this cellular activity, and means the impairment of cell function by exciting factors which derange the normal process of building up and breaking down the alveolar process by the cell (metabolism). There exists such a degree of this perverted metabolism in certain diseases of the system that destruction of the alveolar process progresses rapidly without the knowledge of the patient. In blood dyscrasia, anemia, syphilis, scurvy, rickets, pellagra, tuberculosis, etc., perverted metabolism will be found to a marked degree involving the alveolar process, and these diseases must be overthrown before the alveolar process can be returned to a healthy state. This fact has been brought out by me in former papers.<sup>2</sup> The question naturally arises, why is it that the alveolar process is always the first to be involved, and why is destruction of cell metabolism so rapid in this structure?

#### TRANSITORY STRUCTURES.

In the study of a disease the nature of the structures under discussion must first be considered. Especially is this the case in the present instance, since the structures which are here involved have no analogue in the human body.

First, the alveolar process and also the peridental membrane, mucous membrane, and the gum tissue covering the alveolar process are transitory structures. These structures are all dependent upon the alveolar process. They

<sup>1</sup> TALBOT. "Interstitial Gingivitis and Pyorrhea Alveolaris." 1899.

<sup>2</sup> *Idem*.



develop and absorb away, depending upon the eruption and loss of the teeth.

Second, the teeth are foreign bodies so far as this disease is concerned. There is no nourishment from the blood entering the tooth except through the apical foramen.

Third, this makes the alveolar process an end-organ—the only pronounced bony end-organ in the human body. The arteries, veins, and nerves extend through the alveolar process in all directions and stop at the root of the tooth. They are called terminal arteries, etc. The peculiar situation of the alveolar process, therefore, makes it very susceptible and sensitive to irritations, stasis, and nutritional disturbances.

#### FURTHER RESEARCHES.

After thirty-five years of research I am grateful to have lived to this period when so much research has been done by physicians upon malnutrition in acidosis, scurvy, pellagra, rickets, beriberi, and other diseases due to faulty metabolism, so intimately associated with the jaws and teeth, and in the laboratory upon animals. Although many research workers showed years ago that these diseases were not due to infections, to substantiate these facts it required actual research to prove or disprove the work already performed. Reports are now fast coming in to show that these diseases are not the result of infection but are due to malnutrition and faulty metabolism. I quote editorial from the *Journal of the American Medical Association*, April 24, 1920, p. 1169, "Scurvy Not a Bacterial Disease."

Acquired beliefs are not easily given up when once they have become deeply rooted in the customary thought and writing of a period. This fact has often been illustrated by the tenacity with which medical men tend to cling to traditional theories that have been tried by the tests of science and found wanting. It was a long time before the version of the etiology of malaria now current became accepted by every physician. Before the possible significance of insects in the

transmission of disease became common knowledge, the idea of ascribing real bodily danger rather than mere temporary discomfort to the seemingly unimportant mosquito made slow headway.

On the other hand, when once some novel type of agent has been clearly demonstrated to be concerned in the causation of hitherto unexplained diseases, it soon tends to achieve a degree of popularity that may subsequently actually become detrimental. Thus, when bacteria were at last universally admitted to be potent causes of pathologic changes in man, bacteriology was promptly called on to explain many of the unsolved mysteries of disease. For centuries, scurvy was regarded as a disease due to dietetic errors. Then came the time when the theories of the etiology of scurvy began to include that of a bacterial origin. Following Coplans<sup>1</sup>, Jackson<sup>2</sup> and her collaborators in this country have offered some experimental support for this view. Thus they found coccus-like bodies in microscopic sections of lesions in scorbutic guinea-pigs, and they isolated Gram-positive and Gram-negative organisms from the diseased joints, muscles, and lymph nodes of these animals. Pure strains of these bacteria introduced into guinea-pigs gave rise in most instances to hemorrhagic and other lesions in the bones, joints, muscles, lymph nodes, and organs.

It is not difficult to believe, however, that animals in a scorbutic condition due to dietary deficiencies may readily be susceptible to a secondary bacterial invasion, just as terminal infections in many chronic conditions have no direct relation to the primary disease. Of late the study of experimental scurvy has been extensively prosecuted in England and America, with the result that the disease can now be evoked, averted or cured with considerable precision by purely dietary control. This fact of itself negatives the probability that bacterial infection is a prime factor in the genesis of scurvy. The products of putrefaction have also been charged with responsibility for the appearance of scurvy. Torrey and Hess<sup>3</sup> have concluded,

<sup>1</sup> COPLANS, M. *Tr. Epidemiol. Soc.*, 23, 1, 1904.

<sup>2</sup> JACKSON, LEILA, and MOORE, J. J. *J. Infec. Dis.*, 19, 478 (Sept.) 1916. JACKSON, LEILA, and MOODY, A. M. *Ibid.* 19, 511 (Sept.) 1916.

<sup>3</sup> TORREY, J. C., and HESS, A. F. *Proc. Soc. Exper. Biol. & Med.*, 15, 74, 1917-1918.



however, that scurvy, both of guinea-pigs and of infants, is not associated with an overgrowth of putrefactive bacteria in the intestinal tract.

The most convincing evidence against the bacteriologic hypothesis has been offered by Givens and Hoffmann<sup>1</sup> from the Research Laboratories of the Western Pennsylvania Hospital, Pittsburgh, who have made bacteriologic examinations of the blood and tissues of scorbutic animals. Blood from the latter, regardless of the diet producing the disease, has been found to be sterile. The enlarged front joints of guinea-pigs developing scurvy on oats alone were sterile; this was likewise true in the majority of cases of guinea-pigs developing scurvy on other special diets. Occasionally, staphylococci or diplococci were isolated; but these could not be made to produce scurvy when introduced into healthy guinea-pigs. The intestinal flora likewise showed no differences between the scorbutic and non-scorbutic animals which could explain the genesis of the disease.

With the bacteriologic hypothesis left without tenable scientific confirmation, with McCollum's theory that chronic constipation is a decisive factor abandoned<sup>2</sup>, and with an abundance of experimental evidence in favor of the view that dietary deficiencies play the decisive part in the genesis of scurvy, the current studies on antiscorbutics are placed on a more stable foundation. It matters little that they have in the main been tested primarily on animals, notably the guinea-pig and the monkey; for the essential identity of the disease in these animals and in man has been generally accepted by investigators.

I have copied the editorial in full because the reasoning has so much to do with the clear understanding of the work we as a profession are called upon to do in the treatment of interstitial gingivitis.

<sup>1</sup> GIVENS, M. H., and HOFFMAN, G. L. "Preliminary Observations on the Relation of Bacteria to Experimental Scurvy in Guinea-Pigs." *J. Biol. Chem.*, 41, xxxiii (March) 1920.

<sup>2</sup> COHEN, B., and MENDEL, L. B. *J. Biol. Chem.*, 35, 425 (Sept.) 1918. CHICK, H. HUME, E. M., and SKELTON, R. F. *Biochem. J.*, 12, 131, 1918. HESS, A. F., and UNGER, L. J. *J. Biol. Chem.*, 35, 479 (Sept.) 1918. HARDEN, A., and ZILVA, S. S. *Biochem. J.*, 12, 270, 1918.

#### ERROR IN DIET IS THE CAUSE OF PELLAGRA.\*

That pellagra is not an infectious disease but caused by a diet deficient in proteins and vitamins is the opinion of Dr. Joseph Goldberger of Washington, D. C., who at the meeting of the section on pathology and physiology of the American Medical Association at the Grunewald Hotel, New Orleans, Wednesday, April 28, 1920, told of an experiment on eleven heroic convicts in Mississippi during 1915.

In order to allow him to demonstrate the correctness of his theory, said Dr. Goldberger, eleven white prisoners volunteered to be isolated and fed nothing but cereals for six months. Although segregated, six of the eleven voluntary subjects developed pellagra, as expected.

Dr. James W. Babcock, of Columbia, S. C., said that according to an Italian report during the war, the amount of pellagra in Italy decreased sharply, due to the fact that the people ate the better food provided for them by the government instead of their usual diet of corn. In Turkey and Egypt, too, he said, it had been found that the disease was caused by protein starvation.

In the discussion which followed Dr. Martin F. Engman, St. Louis, and Dr. Marcus Haase, Memphis, Tenn., corroborated these statements.

#### BERIBERI.<sup>3</sup>

Baron K. Takaki, inspector general of the Japanese navy, in 1875 encountered a large number of patients suffering and dying from beriberi. They frequently constituted three-fourths of the whole number of persons in the hospital. After prolonged studies in Europe, Takaki returned to Japan in 1880 only to find conditions unchanged with respect to a scourge that threatened to destroy the efficiency of the Japanese

\* To appear in the *Journal of the American Medical Association*.

<sup>3</sup> *Journal of the A. M. A.*, May 15, 1920, p. 1404.

navy. In 1883 by a careful examination he found that the rations in some of the posts contained much carbohydrate with relatively little protein. Takaki changed the old dietary system in which rice, which was rich in carbohydrate and poor in protein, predominated and instituted a new diet including milk and meat. The diet reforms promptly produced beneficent effects. Vedder has since stated that beriberi was reduced in the Japanese navy as a result of a change of diet.

Takaki improved the physiologic quality of the ration of the navy. His experiences form an interesting chapter in the history of diet in relation to disease.

All constitutional diseases due directly to malnutrition and all prolonged constitutional diseases causing faulty metabolism act directly upon the cells of the alveolar process, causing interstitial gingivitis and bone absorption.

#### CLIMATIC INFLUENCES IN INTERSTITIAL GINGIVITIS.

In my work upon "Interstitial Gingivitis and Pyorrhea Alveolaris," Chapters XIX and XX, I showed by extensive research how climatic influences produced interstitial gingivitis. I cited the fact that higher altitudes in Switzerland in building the mountain railways caused the workmen to suffer many disagreeable symptoms of severe pain in the jaws and teeth, which latter afterwards became loose, the gums inflamed and the teeth had to be extracted. I also showed how English troops in South Africa and American troops in Cuba and the Philippines suffered from a disease called scurvy which was due to climatic changes and changes in diet. While many of these cases resembled scurvy, all the constitutional symptoms of scurvy were not present. Only local symptoms of the gums and alveolar process were observed in most cases. In concluding Chapter XIX I say:

The results of these extremes in temperature produce many affections of the heart from a want of quick adjustment of the

eliminating organs to the new environment. In high altitudes and cold climates the skin contracts and elimination of the body waste is thrown upon the internal organs, and *vice versa* in warm climates.

The result is that in these sudden extremes, the functions of the body are slow in adjusting themselves to environment, nutrition is interfered with, vitality is lowered and the structures of the body are affected in the order of their sensibility to auto-intoxic states. The peripheral nerves are usually the first involved; then the arterial coats and the blood stream are interfered with. Transitory structures and end organs thus receive the first impulses of faulty metabolism.

This sets up an inflammation in the capillaries of the alveolar process. No matter how short a time the cause may exist, if the inflammation is once set up, owing to its peculiar action on the alveolar process (even though the cause be removed), interstitial gingivitis in some cases becomes chronic and the destruction of tissue continues.

The late war, which required mountain climbing and high altitudes in balloon and aeroplane ascensions, caused many symptoms to develop in those taking part in them.

Medical researches during and since the war have been very extensive and complete in regard to the barometric pressure upon individuals due to mountain, balloon, or aeroplane climbing. An editorial<sup>1</sup> on "Compensatory Responses to the Oxygen Want at High Altitudes" is worth reading.

Life at high altitudes is liable to be attended with symptoms of illness, whether the sojourn in the regions of lowered barometric pressure be on a mountain, in a balloon, or in an aeroplane. The essential cause of altitude sickness has been demonstrated repeatedly to be a lack of oxygen. Whatever the method by which the oxygen supply of the body is reduced, there will occur adaptive reactions having the evident function of furnishing in some way the indispensable element that is needed by the active tissues. All of the latter become sensitive to the oxygen want, but the responses are undoubtedly initiated in the central nervous system. They are definitely stimulated at first. In the effort to compensate for the reduction of

<sup>1</sup> *Journ. Amer. Med. Asso.*, Feb. 28, 1920. p. 605.



the oxygen supply the blood, the respiration, and the circulation may become involved. Thus, as has been indicated repeatedly in the *Journal*, there may be an increase in the amount of hemoglobin in the body, and associated with this a redistribution of the red corpuscles whereby a reserve supply is thrown into the general circulation; deeper breathing may bring about increased ventilation of the lungs; an increase in the rate of blood flow may occur. Each of these responses tends to insure a more adequate supply of oxygen to the tissues<sup>1</sup>.

In the acclimatization to oxygen want which follows the ascent of a mountain, the respiratory response is almost invariably the first to appear, beginning during the trip or almost immediately after the summit is reached. The increment in the number of erythrocytes comes more slowly and gradually. The alterations in the pulse rate may also be somewhat gradual. These effects, brought about by protracted residence at high altitudes, in turn disappear only gradually when the person returns to a lower barometric level.

As was recently pointed out<sup>2</sup> in relation to the more sudden shifts in altitude corresponding to the rapid flight of the modern aeroplane, similar adaptive responses are undergone by the aviator; but in contrast with the experiences of the alpinist, they develop much more quickly. Gregg, Lutz, and Schneider<sup>3</sup>, who have been engaged in extensive researches on these questions in the Medical Research Laboratory of the Air Service at Mineola, N. Y., have found that following the more sudden changes in atmospheric pressure and oxygen tension such as may occur in aviation, there is no such uniformity in the relative response of the different adaptive mechanisms as is found after the slower ascents on mountains. In other words, the relative values of the different compensatory reactions to low oxygen tension may differ as does the sensitiveness of different persons. The

aeronautic physiologists report that the majority of men appear to make a well-balanced use of the three mechanisms for supplying oxygen. The ventilation of the lungs, the rate of blood flow, and the percentage of red corpuscles and hemoglobin are definitely increased. Some meet the new condition largely by increased respiration, and others depend almost entirely on an increased blood flow. In many individuals, during the early period of exposure to a decreasing oxygen, the burden of compensation is borne wholly by the circulatory and respiratory mechanisms from a part of the burden. There is evidently an interdependence and interplay of the adaptive mechanisms. The same person may compensate differently in each of a series of emergencies associated with lowered oxygen.

In another respect also the compensatory reactions to a rapid reduction in oxygen differ from experiences in mountaineering. They disappear quickly when the oxygen tension is restored. There is little lag in the changes induced. Schneider and his co-workers conclude that the differences in the responses observed under these two different conditions of exposure to low oxygen depend, no doubt, on the suddenness with which the low barometric pressure and low oxygen percentage have been decreased, and on the extent to which they were lowered. In very slow and moderate changes, it is possible that no response may be evoked. They add that possibly the respiratory center, by virtue of greater sensitiveness, may react so much to the stimulus that the increase in respiration for a time cares adequately for the oxygen requirement of the body. In the more rapid decrease in oxygen tension, the respiratory and cardiac centers and very likely the vasomotor centers are stimulated at higher oxygen tensions and at about the same time. Consequently, under some conditions these two mechanisms serve almost equally to care for the oxygen need of the body. Evidently the problems of life at high altitudes must be considered somewhat separately for the various modes of ascent and sojourn in the upper reaches of the air.

Another editorial<sup>4</sup> on "A New Record for Altitude" has much to say on the same subject. The researches show many of the circulatory and respiratory changes and decreasing oxygenation of the blood due to change in altitude. In

<sup>1</sup> An excellent review of the evidence for these adaptive changes at high altitudes will be found in the Manual of the Medical Research Laboratory, War Department, Air Service, Division of Military Aeronautics, Washington, D. C., 1918.

<sup>2</sup> Low Barometric Pressure and Changes in Circulation," editorial, *J. A. M. A.*, 74, 250 (Jan. 24) 1920.

<sup>3</sup> GREGG, H. W., LUTZ, B. R., and SCHNEIDER, E. C. "Compensatory Reactions to Low Oxygen." *Am. J. Physiol.*, 50, 302 (Dec.) 1919.

<sup>4</sup> *Journ. Amer. Med. Asso.*, Feb. 14, 1919, p. 496.



these flights to high altitudes the ascent and descent require only a few hours, hence the blood changes do not produce permanent tissue changes. In mountain climbing and sojourning in high altitudes doing laborious work for weeks and months with scanty nourishing food structural changes must necessarily take place. Filthy, unkept mouths in which interstitial gingivitis is already present no-doubt have much to do with these systemic conditions. It is a pity that those doing research work in air service laboratories could not take minute observations of the gums and alveolar process in this respect.

Two of the greatest medical works ever published are now in press, the "Oxford Medicine" and the "Nelson Loose Leaf Medicine." In the advanced sheets of the "Oxford Medicine," Chapter II, "Climate in Relation to Health and Disease," the author, Dr. Henry Sewall, in a classification of conditions which affect the atmosphere, I, Distribution of Land and Water; II, Latitude; III, Soil and Topography; IV, Altitude (Barometric Pressure); V, Terrestrial Rotation and Revolution, states that these all affect temperature (winds), humidity, radiant energy and electricity. These in turn affect metabolism. He says, p. 66, "The state of the vital organism is not merely the relatively simple one of health, but the living mechanism may have its metabolism and consequently the power of adjustment modified in all sorts of pathologic conditions."

In the preliminary prospectus of "Nelson Loose-Leaf Medicine" table of contents under the division, "Diseases Characterized by Marked Metabolic or Deficiency Disturbances," I find the fol-

lowing group of subjects: "Acidosis, metabolism, gout, diabetes insipidus, diabetes mellitus, obesity, rickets, tetany in infants, scurvy, cancer, beriberi, pellagra, lipomatosis, hemochromatosis, ochronosis." In all of these diseases interstitial gingivitis is observed to a greater or less degree. Owing to the length of this paper I cannot go into further discussion of the subject. Enough references are here cited so that anyone interested in the subject will find enough material for further study.

In conclusion pathologic metabolism of the alveolar process due to malnutrition, producing interstitial gingivitis, may act through the cardiac system, anemic indigestion or any of the systemic diseases especially those of long-standing or intensified diseases.

We know that diseases of the gums, alveolar process and peridental membrane due to drug and metal poisoning and auto-intoxication, are not infectious diseases. We also know that any constitutional or lingering disease will cause a lowered vitality, malnutrition and faulty metabolism, resulting in absorption of the alveolar process, inflammation, and occasionally infection (pyorrhea).

There is not then very much left for the skeptic to speculate upon in regard to constitutional cause or effect in relation to interstitial gingivitis. When we once get these pathologic principles well fixed in our systems in regard to interstitial gingivitis, the pyorrhea (ulceration) stage becomes very easy to understand and the theory that infection is the sole etiological factor in the production of interstitial gingivitis is relegated to oblivion.

31 N. STATE ST.

## The Treatment of Pulpless Teeth.

By P. B. WRIGHT, D.D.S., Milwaukee, Wis.

(Read before the District of Columbia Dental Society, Washington, D. C.)

**T**HERE is probably no branch of dental practice that is receiving greater attention at the present time than the subject under discussion this evening. In fact so much has been said and written about pulpless teeth in their relation to health and so many suggestions as to the best method of treating these teeth, that there is little room for further argument. But it is a good thing to get together and discuss a subject of such importance, and it is with the hope of stimulating a discussion that your essayist appears this evening.

That the dental profession has realized its responsibility and has accepted the challenge of the medical profession in regard to oral focal infection is shown by the interest that is being taken in the subject everywhere. This cannot but result in raising the standard of dentistry, and its effects will be felt in every locality where there is hearty co-operation between the members of the two professions.

The fact that pathological conditions in the apical region of the roots of teeth and in their investing tissues may be the cause of systemic disturbances is, I believe, generally accepted. The public has been enlightened through the press and popular magazines as to the danger of infections in the mouth.

### THE QUESTION OF IMMUNITY.

Opinions differ in regard to the advisability of retaining devitalized teeth in the mouth. Some go so far as to declare that every pulpless tooth is a menace to the health of any person. We can

take issue with this statement, as it has been and is being demonstrated in many offices throughout this country that it is possible to retain pulpless teeth and roots and place them in such a condition that they will not be a menace to health. The question of immunity or natural resistance plays an important part and should not be lost sight of in our diagnosis of a given case. Many healthy individuals with a high resistance and a natural or acquired immunity may carry infected teeth without any apparent ill effects, but no one can tell when this protection will be removed and the resistance lowered, and it is our duty to remove the possible menace to the patient's health before it is too late.

In his book on "Special Dental Pathology," the late Dr. G. V. Black says in regard to immunity:

It should be kept in mind that the natural resistance of the tissues is inclined to prevent or retard the occurrence of systemic lesions from chronic foci. Probably no tissue is more vigorous in resisting infection than the mucous membrane of the mouth. The presence of such a focus does not indicate that the individual is suffering from systemic effects; but he is undoubtedly in constant danger. Certainly many people, probably the majority of those who have such foci in the mouth, will continue in excellent health, or apparently so, for years. There may never be an indication that their health and vigor have been impaired.

On the other hand, it should be remembered that the definite secondary lesions resulting from these foci are of such gradual development that they are generally not recognized by the patient and do not come to the attention of the physician until they have



made such progress as to be incurable, or at least very obstinate in their amenability to treatment. This fact demands the eradication of the foci for the protection of the health of all persons, whether apparently suffering or not.

We cannot expect to correct all the mistakes that have been made in the past, but we have the opportunity to avoid making the same mistakes in the future, and I believe the dental profession will accept this opportunity and will raise the standard of pulp-canal surgery so that it will no longer be a reproach to our profession.

#### DIAGNOSIS.

In dentistry as in medicine and surgery, diagnosis plays an important part, and the value of a careful examination of the mouth cannot be overestimated. Where patients are referred by physicians or appear on their own volition for an examination of the teeth to learn if there are any possible foci of infection, it is our duty to make as thorough and as comprehensive an examination as possible. A general examination of the mouth is first made and any departure from the normal is noted. The gingival borders of teeth supporting crowns or bridge work should be carefully examined, as the ill effects of poorly-fitting bands or attachments are not fully recognized by many members of our profession. The occlusion should be carefully noted, as many cases diagnosed as pyorrhea have undoubtedly had their origin from malocclusion. Pyorrhea pockets should be located, and the presence of fistulous openings on the gums should be noted. The teeth are then tested for vitality by the use of the faradic battery. Other methods for testing the teeth, such as ice, cold water, heat or ethyl chlorid may be used, but the writer has found the faradic battery more satisfactory in the majority of cases, except in teeth with shell crowns or very extensive gold or alloy restorations. In these cases there will be a response to the electric current whether the tooth is vital or not, and some other means will

have to be used to determine the state of the pulp. Of course this method is not infallible, as many nervous patients will imagine they have sensation even in a pulpless tooth.

The writer begins with the right upper central incisor and goes back to the last tooth on that side having his assistant mark on the examination chart over each tooth plus (+) or minus (-), according to the response made by the patient. Crowns are marked "C" and bridge work "B" with a bracket connecting the abutment teeth. Missing teeth are marked "M". The upper left side is next examined and then the right lower side, finishing with the left lower.

Next follows the X-ray examination which is made to include all the devitalized teeth and others under suspicion, also loose or pyorrhetic teeth, to determine the extent of destruction of bony attachments. Missing teeth and unerupted third molars are always investigated.

In this manner a complete survey of the mouth is made and if the case is one referred by a physician or dentist, a written report is sent and the patient is advised as the case indicates. It is here that co-operation with the physician is necessary and unless there are very marked indications of pathologic lesions in the mouth, the dentist should reserve his final decision until other possible causes of systemic disturbances have been discovered or eliminated. But as Dr. Black has pointed out in the lines above quoted, it is our duty to eradicate any possible source of infection, and the question of extraction or treatment with an attempt to save the teeth under suspicion is the next consideration.

There are several points which have an important bearing on our decision, namely, the importance of saving the tooth, its value to the patient, the difficulties to be overcome and the probabilities of success. Also the ability of the patient to stand the physical and financial strain incident to a thorough pulp canal operation; their appreciation of, and co-operation in the efforts to save the tooth; and their understanding of



the importance of subsequent radiographic examinations to check up the condition of that tooth at stated intervals.

#### RAREFIED AREAS.

Where there is a rarefied area, the physical condition of the patient should first be considered. It must be admitted of course that X-ray findings are not infallible and we cannot always say definitely what an abnormal shadow represents. An area of lessened density at the apex means that a change from the normal has taken place which may be from various causes, but we cannot say positively that there is a pus cavity, or a granuloma, or a cyst. But clinical experience has shown us that this abnormal condition should not remain untreated. In extreme cases where the immediate removal of all possible foci of infection is demanded the affected tooth or teeth should be removed at once; that is to say within a reasonable time. Where there are a number of teeth involved, only two or three should be extracted at one time at intervals of a few days to avoid systemic complications. It is probable that many teeth have been needlessly extracted in certain cases, but it is also probable that many more teeth have been retained which ought not to have been allowed to remain in the mouth and which have seriously affected the health.

The decision in regard to extracting or retaining the affected teeth having been made, we are now ready to discuss ways and means of placing pulpless teeth in such a condition that they will be safe for the patient to retain.

As a matter of safety only the minimum of pulpless teeth should remain, leaving only those that are in important positions, and those which are indispensable for certain types of removable bridge work.

#### ASEPSIS.

The successful practice of pulp-canal surgery depends on one feature above all else, and that is asepsis. The principles of modern surgery should be observed as completely as possible without going to

unnecessary extremes. It is not considered necessary to wear an operating gown or a face mask or rubber gloves.

There are probably more failures in pulp-canal operations as a result of non-observance of the simple rules of asepsis than from any other cause.

Careful technique and attention to details is another prime requisite, so that we have three main essentials in pulp-canal surgery, *viz.*, diagnosis, asepsis and careful technique.

It is generally acknowledged that there is no department of dentistry demanding better judgment, more accurate diagnostic ability, or more delicate and exact operative skill than that of the treatment of pulpless teeth.

The profession is indebted to several of its members who have helped to develop the technique of pulp-canal surgery. We have suffered a great loss in the passing away of Dr. Callahan. At the time of his death he was doing experimental work which undoubtedly would have proved of great value and even now may be carried on to successful completion. Drs. Rhein, Ottolengui, Grieves, Buckley, Best, Coolidge, your own Dr. Crane, and others have made valuable contributions. There are a few textbooks which have been very helpful, among which may be mentioned that of Dr. Thoma, on "Oral Abscesses;" Dr. Black on "Dental Pathology;" Dr. Buckley, on "Therapeutics," and those of Drs. Raper, McCoy and Ivy on X-rays and diagnosis.

#### CLASSIFICATION OF PULP-CANAL OPERATIONS.

The classification proposed by Best has been modified by your essayist and for convenience is presented as follows:

1st. Operations on teeth which contain imperfect root-canal fillings.

2d. Operations on teeth with non-vital pulps and no root-canal fillings.

3d. Operations on teeth with vital pulps.

In the first class we may or may not have an abscess and there may or may not be a fistulous opening. In the sec-

ond, the same conditions may prevail as in the first and the pulp chamber may or may not be open to the fluids of the mouth. There may or may not be rarefied areas at the apices of the roots and there may or may not be systemic involvement.

A correct diagnosis of the conditions present will determine the line of treatment to follow and with slight variations the method of procedure is the same in each class, except in teeth with vital pulps.

#### RADIOGRAPHS NECESSARY.

In every case a good radiograph is necessary before beginning a pulp-canal operation. It will show the extent of the original root filling, if any. It may disclose a broken broach or instrument or it may show a perforation from some previous operation. Knowing these things in advance may save the operator considerable time and possibly avoid an embarrassing situation, and it will give the dentist a greater sense of confidence in operating than he could possibly have without it. The radiograph is invaluable in checking up the progress of your work, especially in difficult cases where the canals are hard to open or where there is danger of making a perforation. In fact, the radiograph should be freely used from start to completion of the operation if the best results are to be secured. Many times the radiograph will reveal a rarefied area and the patient will apparently be in the best of health. The resistance of the patient and his natural or acquired immunity will protect him, but no one can say how long this favorable condition will continue. To be on the safe side every imperfect root filling should be removed and the canal re-treated and filled. We are told that it is not so much the quantity of infection that is dangerous as it is the kind and virulence of the micro-organisms present; and many times an unfilled root canal without rarefaction in the apical region may be as much of a menace as a case with a very marked area of absorption. Where the radiograph shows no evidence of pathological conditions in

the apical region, the tooth should receive the regular routine treatment to be described later.

#### STERILIZATION.

As was stated before, asepsis is the prime requisite in the successful treatment of pulp canals. There are several methods of securing the proper sterilization of instruments. The method found to be the most satisfactory in our practice, is in the use of the "Pentz" system. This furnishes superheated steam quickly and conveniently and quietly. After being cleansed in hot water the instruments are sterilized and dried in less than one minute in the Pentz sterilizer. Cotton pellets and paper absorbent points are put through the sterilizer before being used. Gutta-percha canal points are immersed in alcohol for several hours and then placed in a glass container and again immersed in alcohol just before being used in the canal. Before applying the rubber dam, the mouth is sprayed with a mild antiseptic, and after the dam is in position, the field of operation is swabbed with iodine followed with alcohol.

#### TREATMENT OF TEETH IN CLASSES I AND II.

If there are no acute symptoms which demand opening the canal to the apex, as in the case of an alveolar abscess, it is good practice to seal a suitable antiseptic in the pulp chamber for twenty-four hours. Your essayist has found Buckley's formocresol a very efficient remedy in cases of putrescent pulps. Where a gutta-percha root filling is to be removed it is better to seal a germicide in the pulp chamber for twenty-four hours. Then by applying Xylol to the gutta-percha it may be softened and dissolved so as to make its removal quite a simple operation.

#### PREPARATION OF TOOTH FOR OPERATION.

The tooth should be prepared for operating by removing all deposits of



tartar, etc. Remove sharp edges of enamel and otherwise prepare for applying the rubber dam. If the tooth is badly broken down, it may be restored by a thin wall of amalgam, or a band of copper, platinoid, or gold may be cemented to the tooth which will make the application of the rubber dam much easier and will help to retain the temporary stopping or cement between treatments.

Remove sufficient enamel and dentin to gain free access to each canal. It is much better to sacrifice tooth substance in gaining proper access to the canals than it is to run the risk of not properly opening the canal and thus inviting failure of the root-canal operation.

Frequently we hear objections raised against the use of caustic acids and alkalis in pulp-canal treatment. If these valuable agents are carefully used there is practically no danger of carrying them beyond the apex.

The nature of the agent used should be well understood and the greatest care observed. In treating a tooth with a putrescent pulp it is my practice at the first treatment to remove all loose decay and irrigate the pulp chamber with an antiseptic solution. For this purpose I have found Marchand's peroxid and bichlorid of mercury in the 1:1000 solution as suggested by Dr. Rhein, a very efficient agent. The openings to the pulp canals are exposed but no attempt is made to enter the canals at this time. A pledget of cotton slightly moistened with formocresol is placed in the pulp chamber and the cavity is sealed with temporary cement. After twenty-four hours the rubber dam is again applied and the openings to all the canals are freely exposed, which usually requires considerable cutting away of the crown of the tooth, especially in the case of molars where it is absolutely necessary to gain proper access to the mesial and buccal canals. If the tooth is to be crowned or used as a bridge abutment, two-thirds of its crown may be ground away which will make it much easier to treat. This will also remove the oc-

clusal stress and reduce the soreness which often follows root-canal treatment.

#### TECHNIQUE OF CLEANING THE CANAL.

"Sodium and potassium" is a combination of two metallic elements which results in a substance having a great affinity for organic matter and moisture. The putrescent matter in pulp canals is rapidly reduced to a liquid or soapy consistence and may be washed out of the pulp chamber or absorbed by cotton or bibulous paper. Frequently the smaller canals are clogged with pulp debris, which is readily attacked by sodium and potassium, making it possible to open up these canals which otherwise would often resist other methods of attack. In large canals care should be used in working in the apical third of the canal and only very minute portions of sodium and potassium should be introduced into the canal, using care to avoid forcing the caustic material through the apical opening. After a few minutes' use of this agent the canal should be irrigated with the peroxid solution until all effervescence ceases and then the canal should be dried carefully. A mild antiseptic is sealed in the pulpal opening of the canal and for this purpose dichloramin-T is a valuable agent. Oil of cloves is also useful. This procedure is carried out in each canal and the cavity again sealed.

At the next appointment, after an interval of two or three days, an attempt is made to reach the apex of all the canals. The smaller ones are flooded with phenol sulfonic acid and a fine smooth broach is passed to the apex. This will allow a very small quantity of the acid to follow the canal and to some extent decalcify the dentin so that it may be enlarged by spiral reamers, files and broaches. Before attempting to use the larger instruments, the surplus acid is absorbed from the canal. If the canal is not sufficiently enlarged after a few minutes' work it is again flooded with the acid and the process is repeated.

If the patient gives indication of sen-



sation at the apex it indicates that you are either reaching the desired goal or that there is vital nerve tissue which must be disposed of. At this point it is best to flood the canal with a sterile solution of bicarbonate of soda, working it into the canals until all effervescence ceases. Then carefully dry the canal and insert diagnostic wires into the canals and radiograph the tooth.

By checking up your progress in this way you avoid going too far beyond the apex in some cases and avoid perforating the roots in others, and you will be working intelligently in *all* cases. When you meet an obstruction in the canal, it is best to stop and find the cause if possible. The buccal canals of upper molars and the mesial canals of lower molars usually offer the greatest resistance and require the greatest patience and manipulative skill.

If the radiograph shows that the diagnostic wires have reached and passed through the apical opening of the canals, the case is then ready for ionization. If there is little or no area or only a slight thickening of the peridental membrane at the apex, one treatment is considered sufficient, but if there is a considerable area showing the tooth is ionized two or three times at intervals of two or three days, and should always be ionized just before filling the canal.

At this point it is good practice to take a smear or culture from the apical region to determine the presence or absence of micro-organisms and govern your treatment according to the bacteriological findings. Further ionization may be necessary before the canal can be safely filled.

In favorable cases such as the six anterior teeth and some of the bicuspid where there is a chronic condition and destruction of tissue, the operation of resection of the root end may be successfully performed and the infected tissue surgically removed.

There seems to be considerable merit in the silver nitrate method as advocated by Dr. Percy Howe and we may expect further developments along this line

which may simplify our treatment in many cases.

The long-continued treatment of root canals, using first one remedy and then another with the vain hope that some miracle may be performed, should be discouraged. Strong germicides used in the root canals or forced through the apex may control pus formation for a time, but they will also lower the resistance of the tissues and retard or destroy the process of repair which is so essential. It is considered the best practice to thoroughly cleanse and curet the canal to and through the apex without disturbing the functions of the tissues at the apex and thus assist the natural reparative processes to restore as nearly a normal condition as possible. The prime essential in the treatment of pathological conditions is to remove the cause.

#### ELECTROLYTIC MEDICATION.

The term ionization is the one commonly used to describe the process of sterilizing the pulp canals and the apical area by means of the electric current which carries an antiseptic in solution and liberates ions of the element used. The term electrolytic medication is probably more scientifically correct, but for convenience the shorter term will be used in this paper. There is a difference of opinion in regard to the value of this method of sterilization, but clinical experience proves it to have considerable merit. Its stimulating effect on the tissues in the apical region is very beneficial. It rapidly reduces irritation and promotes the absorption of inflammatory products in the apical area and induces the formation of healthy tissue. Ionic medication has been successfully used in the treatment of pericementitis and we have found it of great value in reducing post-operative pain and irritation following root-canal filling which is present in a few cases. The suggestion of Dr. Fette of Cincinnati for using a solution of magnesium hydrate (Epsom salts) on the positive electrode, which is placed in

contact with the affected tooth around which is wrapped a strip of cotton saturated with the same solution, has given very good results. The current is applied for three minutes and as strong as the patient can comfortably stand.

Those who are not familiar with the subject of ionization will do well to obtain a good textbook on that subject and master the principles and technique before attempting to use it in practice. I believe there are great possibilities in this branch of therapeutics and that it will soon become a recognized essential in the treatment of pulpless teeth and diseases of the periodontal membrane.

#### DEVITALIZATION OF TEETH.

The treatment of teeth, the vital pulps of which are to be removed for some good reason, throws a great deal of responsibility on the dentist. We are dealing with vital tissue. It is a surgical procedure and should be governed by the rules of surgery. There are three ways of removing the pulp surgically and practically without pain: (1) By means of conduction anesthesia; (2) by what is known as pressure anesthesia, and (3) by administering nitrous oxid and oxygen to the patient. The technique of pulp removal consists in thoroughly anesthetizing the pulp tissue and gaining free access to all the canals. A fine XXX smooth broach is passed to the apex of each canal. This is followed by barbed broaches of the proper size and the pulp removed *en masse* if possible. If the smaller canals offer any resistance to the passage of the larger broaches, the use of sodium and potassium will be advantageous and in general the technique as outlined for enlarging all canals is followed.

After removing the pulp, the best results are obtained by enlarging the canals immediately and preparing them for filling, taking advantage of the anesthesia which will make it possible to thoroughly cleanse and enlarge the canal to and through the apex. The diagnostic wire should be passed slightly through the apex so that it will show in

the radiograph that the important objective point has been reached. In removing the pulp the main idea should be to remove all of it, and as there is usually one main foramen through which the pulp receives its blood supply, it seems reasonable that this foramen should be opened sufficiently to allow a very small diagnostic wire to pass through. If there are multiple foramina, we must depend on chemical as well as mechanical means to remove all pulp filaments. Here the apex curet is very valuable. The canals are never filled immediately following the removal of the pulp, as there is frequently a post-operative hemorrhage which will find a vent in the open canal. A dressing of dry sterile cotton or bibulous paper is sealed in the pulp chamber and the tooth is sealed with temporary stopping covered with cement. A pulp canal treated in the manner just described does not require a medicated canal filling which has so-called "permanent germicidal" qualities to embalm any suspected fragments of pulp tissue.

#### TECHNIQUE OF FILLING THE CANAL.

After an interval of from three to five days the tooth is again prepared for operating by cleansing. The rubber dam is adjusted and the tooth and field of operation sterilized. The canals are irrigated with the peroxid solution as described. This will remove any traces of hemorrhage and leave the canal in a sterile condition. The instruments for filling the canal should be selected and put through the sterilizer and everything made ready for the filling operation. The canals should be finally dried with alcohol, followed by sterile absorbent paper points. A very thin solution of chloroform and sterilized gutta-percha is prepared for each operation. In filling upper teeth the solution is carried to the canals by means of a suitable glass syringe. In teeth with more than one canal the smaller canals should be filled first, the other canals being closed temporarily with a small pledget of sterilized cotton. A smooth or small spiral



broach which will pass to the end of the canal is used to pump the thin chloro-percha solution to the end of the canal, which is kept flooded with the solution. A gutta-percha point or cylinder of suitable size is now passed into the canal and worked up and down with a pumping motion and when the point is softened it is packed with a canal plugger, the canal again flooded with chloroform and other points or cylinders packed to place until the canal is filled. In large canals the pumping motion should be modified somewhat to avoid forcing too large a quantity of the thin chloro-percha through the apical opening, but in the majority of cases encapsulation of the end of the root should be the main object in the operation in order to seal all the foramina and to insulate the root end. The gutta-percha in the canals should be packed and condensed into a homogeneous mass and the pulp chamber sealed with oxychlorid of zinc cement.

In conclusion let us briefly summarize the essential features in pulp-canal operations:

1. Diagnosis—To determine the condition of the tooth to be operated on, *viz.*, the pathological condition, the length, shape and position of the roots, the presence or absence of root fillings or foreign bodies in the canals, the con-

dition at the apices of the roots, the importance of saving the tooth, the health of the patient and all other conditions. The patient should be advised as to the condition and the possibilities of success or failure of the operation.

2. Use of the X-ray.

3. Careful technique and attention to details.

4. Asepsis.

5. Use of rubber dam.

6. Radical cutting away of tooth structure to gain free access to the root canals.

7. Use of sodium and potassium and phenol sulfonic acid, followed with bicarbonate of soda.

8. Suitable instruments.

9. Ionization and bacteriologic examination.

10. Root-canal filling.

11. Subsequent radiographic examination.

If the radiograph shows the canals filled and the root ends encapsulated, we may well congratulate ourselves on the result and rest assured that we have done everything possible to put that tooth in such a condition that it will give promise of many years of usefulness and comfort.

425 E. WATER ST.



## The Nerve Cells of the Dental Pulp.

By Dr. JUAN CAROL MONTFORT, Barcelona, Spain.

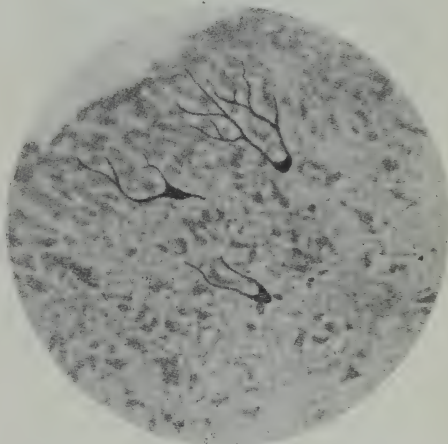
UNTIL 1912 investigators in the interesting study of the nerve cells of the dental pulp<sup>1</sup> were unanimous in declaring that the nerve cells, after making numerous ramifications at the lower margin of the dentinoblasts\* terminate freely around these, or also in the dentinal tubules. That is to say, according to these ideas, the nerve terminations in the teeth were the same as the corneal endings of the nerves, and the intro-epidermic terminations of the cutaneous nerves. The only point debated was whether the terminations took place around the dentinoblasts—theory of the sensibility of the dentinoblasts—or if the nerve fibers penetrated in the dentin, following Tomes fibers—theory of the dentinal innervation.

In May 1912 we gave our opinion that there was a terminal nerve apparatus, thus indicating for the first time that the nerve fibers did not end directly in the dental pulp, but, on the contrary, that the termination was made by the intervention of nerve cells situated in the substrata of the polymorphic cells, which we denominate the cells of connection (Fig. 1), clearly demonstrating the existence of nerve cells in the dental pulp; thus establishing the theory of a terminal nerve apparatus in the pulp.

Two years later at the Odontologic

Congress in Barcelona<sup>2</sup> we completed our preliminary work by an article on the morphology, origin, and signification of the receptive cells, or receptive elements, of the terminal nerve apparatus of the teeth; in which we presented a new aspect of the problem, thereby opening a further field of investigation wherein

FIG. 1.



Peripheric zone of human dental pulp. Cells of connection retouched to show them more clearly.

<sup>1</sup> See *La Odontologia*, May 1912, paper by Carol on "The Nerve Cells of the Dental Pulp."

\* [NOTE.—The author has used the term dentinoblast instead of odontoblast to specifically designate the dentin forming cells as distinguished from the cementoblasts, the ameloblasts and the other odontoblastic cells which have a specific designation expressive of their function.—Ed.]

a definite solution may be found. We reproduce here a photograph (Fig. 2) which accompanied that paper, and also another (Fig. 3) obtained by a different method of impregnation. In both of these exposures the receptive cells are

<sup>2</sup> Minute Book of the Seventh Spanish Dental Congress, Barcelona, April 1914, and *La Odontologia*, September 1914, on the same subject.

clearly shown, and we continue to find them present in our later preparations.

Since making these discoveries public in 1912, we have come across no other work referring to nerve cells in the pulp, until Mummery<sup>3</sup> in 1918 wrote of the "nerve-end cells" in the sub-dentinoblast strata, this eminent English Histologist's work helping to augment the fundamental value of our observations as to the existence of these sub-dentinoblastic

the topographical differentiation of the dental pulp (Fig. 4). To the established division of Central Zone *b* and the Peripheric Zone *a*, it is necessary to add a sub-division of the peripheric in the zone or layer of the dentinoblasts (1), and in the layer of the polymorphic cells (2), which correspond to the group of cells generally termed stellated by the majority of histologists. It is also necessary, in the central section, to differen-

FIG. 2.

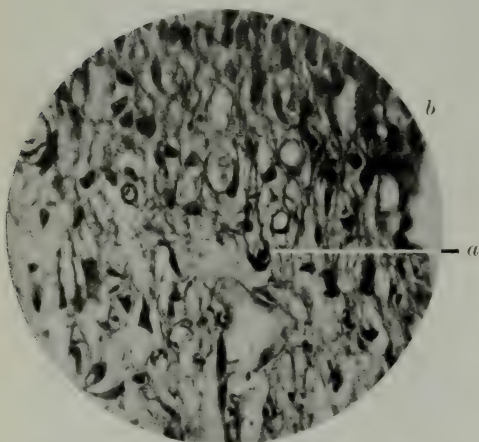


FIG. 3.

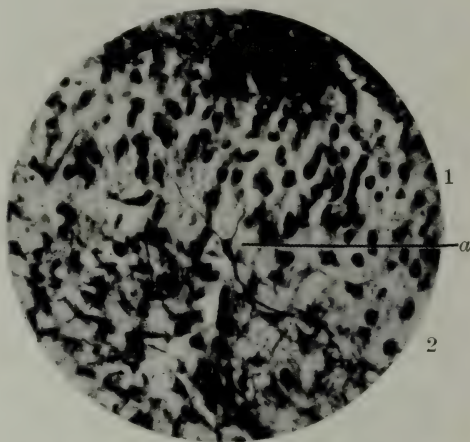


FIG. 2: Section showing the strata of polymorphic cells greatly magnified. In the center can be distinguished a receptive cell (*a*), showing dendrons rising toward the dentinoblastic zone (*b*).

FIG. 3: Section of human dental pulp prepared by the Bielchowsky method: (*a*), sub-dentinoblastic nerve cell, called connection cell, receptive cell, etc.; (1) dentinoblastic zone; (2) strata of polymorphic cells.

nerve cells. We further hope in a conjunctive work, which we are about to publish, to thoroughly discuss the conclusions arrived at by this investigator, and to show that his theory does not agree with our discoveries so clearly proved by the microscopic photographs herewith presented.

The intention of the present article is to make known some new nerve cells of the dental pulp, distinct from those mentioned in 1912 in the cellular polymorphic strata, to which we had reference. We now desire to call attention to

tiate a zone in which are found small bloodvessels and nerve fibers (3), and the real central zone where lie the larger vessels and nerve trunks (4). In the upper part of the crown this last layer of vessels and nerve trunks does not exist, due to the arboreal form adopted in their distribution.

The new nerve cells (Fig. 5) are located in the zone of the small vessels, isolated, that is to say, not in groups, and are about twice the size of the sub-dentinoblastic nerve cells, and show a triangular form of body, with a robust nucleus; the protoplasmic expansions which branch off from the extreme angles being potent and long. We were

<sup>3</sup> MUMMERY. Communication to the Royal Society of Medicine, May 1918.

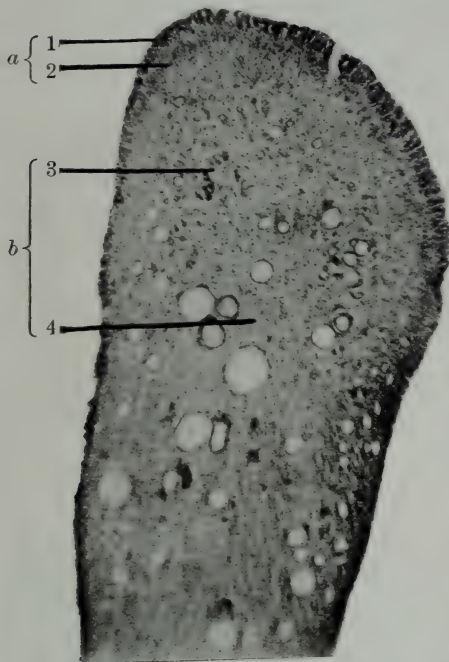


not able to follow precisely the appendices owing to the deflections that they take in their course, which causes them to disappear from the preparation, and although we succeeded in getting some quite thick cuts, we were able to follow only one of them (Fig. 5, *a*) until near the strata of the polymorphic cells, where it disappeared without giving off, in all

enveloped in a covering, the continuation of the cell membrane, presenting an analogous aspect to the medullated nerve fibers of the nerve trunks.

Unfortunately in our actual preparation we were again unable to observe them to their natural terminations, from which observations, no doubt, would be deducted interesting facts as to the real signification of these elements. The axis cylinder of the cell photographed is lost sight of close to a bloodvessel not far from the field of observation. The nerve fibers shown in this preparation (Fig.

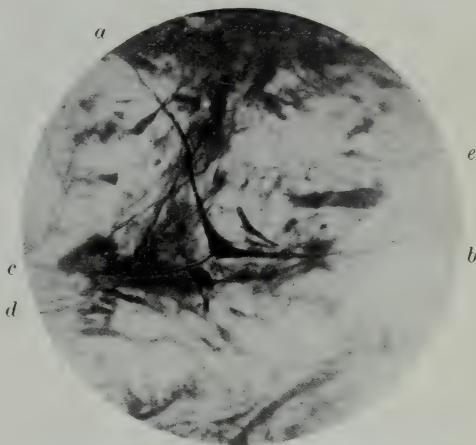
FIG. 4.



Topographic section of human dental pulp (transverse cut): *a*, peripheric zone; *b*, central zone. 1, dentinoblastic layer; 2, polymorphic cell layer; 3, layer of the small bloodvessels and nerve fibers; 4, layer of the large bloodvessels and nerve trunks.

its course, any collateral branch. The other (Fig. 5, *b*) appears cut short soon after leaving the cell body. The axis cylinder (Fig. 5, *c*) departs from the apex of the body and advances, without distributing collaterals, in a straight course to the superficial pulp in company with other nerve fibers, which are plainly manifested in the lower part of the photograph (Fig. 5, *d*). After departure from the cell body it appears

FIG. 5.



Nerve cells of the central zone of the human dental pulp. Zeiss ocul. proj. obj. im. 1/12. Method of Bielchowsky.

5, *d*), fibers which present the same aspect as the protoplasmic expansions described, rise to the pulp cusp, ramifying near the polymorphic cell strata, in whose elements they finally disappear.

Along with these nerve cells of the central pulp the preparation shows other elements of a similar aspect and form, but of a much smaller size, their presence being constant in different territories of the central portion of the pulp; but it would be very adventurous at this writing to attempt to decide as to whether they are distinct nerve elements or cells similar to those described in the evolutionary period (Fig. 5, *e*).

In résumé, we now know there are two



varieties of nerve cells existing in the dental pulp, the receptive cells, or sub-dentinoblastic nerve cells, to which Mummery undoubtedly refers in his "nerve-end cells," and the *nerve cells of the central pulp*, which are those we describe in this paper.

In view of these discoveries, as interesting as they were unexpected, it is perhaps unnecessary to remark that the diagram we prepared in 1914 of the nerve distribution in the pulp, or indeed, any diagrams existing at present on this subject, must perforce be considered inadequate, as we now find ourselves facing

a vast field of exploration, which, the more we study it, the more complicated it seems; so that we feel it is clearly too soon to try to give an exact hypothesis of the signification and mission of any of the elements entering into the nerve apparatus of the dental pulp.

In the conjunctive work we are at present preparing, we shall treat extensively of this aspect of the problem; in this paper, we only present the nerve cells of the central pulp, owing to the importance that this discovery has from the viewpoint of the deductions that may be made from it.

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## The Use of the Marshall Splint in the Treatment of Fractures of the Superior Maxillæ.

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THE appliance illustrated and described in this article is what is known as the Marshall Splint. For the benefit of those who are unaware of the great value of this splint as an aid in the treatment of fractures of the superior maxillæ, I wish to take this opportunity of submitting herewith a full description of its construction and method of application.

In the case herein illustrated, the patient, a man of fifty-five, was brought into the hospital in a semi-conscious and stupefied condition and evidently greatly intoxicated. While in this condition, it appears, he had fallen down a flight of stairs, sustaining the injuries herein described. Examination revealed a great deal of swelling and ecchymosis under the eyes, which were almost closed. The nasal bones were fractured, and examination of the mouth revealed a fracture of the superior

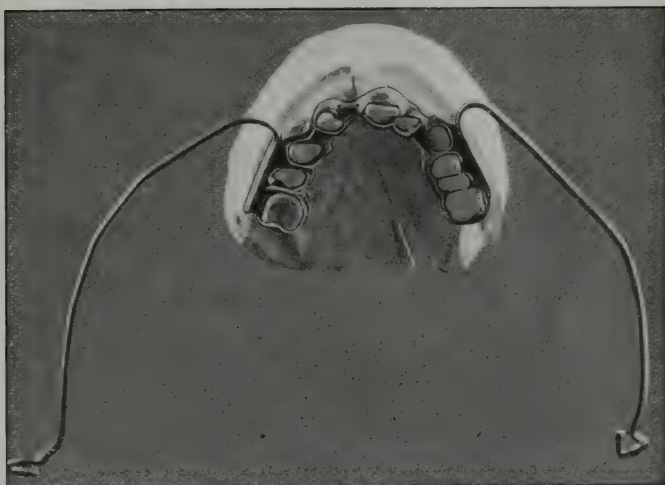
maxillæ through the intermaxillary suture, the line of fracture extending through the entire length of the palate. In addition to this, there were transverse fractures on each side, extending from the median line to the third molar region. The parts were very freely movable, and any attempt at bringing the teeth together in occlusion would force the fractured parts upward and outward. The fractured nose received attention at the hands of the surgical staff. For treatment of the maxillary fractures, it was decided that the Marshall Splint would best serve the purpose of supporting the parts in correct anatomical relationship and occlusion.

### TECHNIQUE OF CONSTRUCTION.

The method of construction of the splint is as follows: Take modeling compound impressions of the teeth of the upper and lower jaws. Correct the

upper model to proper occlusion. From a die and counter-die, swage a nickel ears, and should be bent to conform to the face (Fig. 1).

FIG. 1.



silver cap splint, and reinforce this labially and lingually by means of wire closely adapted to and soldered to these surfaces. Then grind off the occlusal

The splint is then adjusted to the teeth, and by means of bandages extending from these bars to the head is firmly held in position (Fig. 2).

FIG. 2.



FIG. 3.



surfaces. Solder heavy wires to the labial surfaces in the molar region on each side. These wires should be made long enough to extend back as far as the

Another method of adjusting this splint is by means of an elastic strap on each side, extending from the bar to a closely fitting headpiece.

It will be found that this splint serves as an excellent means of supporting the fractured parts firmly, and that it does not interfere with the natural occlusion

of the teeth. It also allows the patient entire freedom of the lower jaw (Fig. 3).

601 WEST 136TH ST.

## Diseases of the Dental Pulp.

### IV. Treatment.

(Continued.)

By HERMANN PRINZ, M.D., D.D.S., Philadelphia, Pa.

(Continued from page 625.)

#### 9. Devitalization of the Dental Pulp.

The successful application of therapeutic measures to a diseased pulp for the purpose of bringing about its resolution unfortunately is restricted to very limited bounds. The only absolute safe prognosis of an inflamed pulp consists in its destruction. Clinical experience bears out the fact that the latter procedure, if carried out under aseptic precautions, is eminently successful and the removal of the pulp does not materially jeopardize the future usefulness of the involved adult tooth. Aside from numerous pathologic interferences with the normal equilibrium of the dental pulp, the clinical practitioner is frequently called upon to destroy this organ for many other reasons.

The indications for the devitalization and removal of the dental pulp may be summarized as follows:

1. All cases of exposure of the pulp, hyperemia, and acute simple pulpitis which, in accordance with the judgment of the operator, offer only questionable chances for resolution.

2. All the other disturbances of the pulp as discussed under their respective headings in the previous chapters.

3. All cases of extensive carious destruction of the tooth crown which call for an artificial substitute.

4. All cases of malformation, malposition or other esthetic defects which call for an artificial substitute for the disordered crown.

5. Certain cases in which a sound tooth is to be utilized as a post for anchoring an artificial substitute.

The various methods employed for the devitalization of the dental pulp may be carried out according to the following procedures:

1. Destroying the living pulp by purely mechanical means, *i.e.*, "knocking out" of the pulp without an anesthetic.

2. Destroying the pulp under a general or a local anesthetic.

3. Destroying the pulp by the actual cautery or a potential caustic.

#### DESTRUCTION OF THE PULP BY MECHANICAL MEANS WITHOUT AN ANESTHETIC.

In bygone days the removal of a pulp by purely mechanical means, *i.e.*, the extirpation of the exposed pulp by inserting a broach or by "knocking out," as this barbaric process is known, was in common vogue. Fortunately, it is rarely practiced at present. The "knocking out" process consisted in driving a suitably shaped wooden stick into the pulp chamber by the quick blow of a mallet. In defense of the advocates of this



method it must be stated, that the pain experienced from this operation when dextrously performed is comparatively little, provided that the pulp is in a perfect state of health, which, however, is rarely the case and which, incidentally, cannot always be ascertained with any degree of satisfaction. However, with the present methods of inducing local anesthesia there is no valid reason for the continuation of such heroic procedures.

#### DESTRUCTION OF THE PULP UNDER A GENERAL OR LOCAL ANESTHETIC.

As a general anesthetic produces insensibility of the pulp precisely in the same manner as in any other organ of the body, no further discussion is necessary at this moment. The administration of nitrous oxid or some other general anesthetic agent is occasionally employed for such purposes. The so-called "dental analgesia" is *not* to be advised for the "painless" removal of the pulp. The administration of a local anesthetic for this purpose is at present so eminently successfully and widely practiced, that its technique, of necessity, must be discussed in detail.

#### INJECTION INTO THE PULP (PRESSURE ANESTHESIA).

By pressure anesthesia, pressure cataphoresis, pulp anesthesia, or contact anesthesia, as this process is variously termed, we understand the introduction of an anesthetizing agent in solution by mechanical means through the dentin into the pulp or directly into the exposed pulp for the purpose of rendering this latter organ insensible to pain. Simple hand pressure with the finger or with a suitably shaped instrument, with the hypodermic syringe or with the so-called high-pressure syringe, is recommended for such purposes.

Before describing the *modus operandi* of the various methods, the histologic structure of the dentin should be briefly recalled. Dentin is made up of about seventy-two per cent. inorganic salts, about ten per cent. water, and an organic

matrix constituting the remainder. The dentin is traversed by a large number of tubules, radiating from the pulp cavity in a more or less wave-like manner toward the periphery, where they branch off, forming a deltoid network. Roemer has counted about 30,000 dental tubules within the area of a square millimeter. These tubules are filled with the processes of the odontoblasts, known at present as Tomes' fibers, and they are concerned with the metabolic changes occurring in the dentin. The dentinal fibrils are protoplasmic in their nature and normally do not carry physiologic sensation in the sense as we understand this term. We can cut, file, or otherwise injure the sound dentin without much inconvenience to the patient. When the fibers have become highly irritated, a mere touch upon the dentin may at once call forth a paroxysm of pain.

1. *Devitalization of the Pulp when Exposed or Covered with a Layer of Decalcified Dentin.* Isolate the tooth with the rubber dam, and clean it with an antiseptic solution. Excavate the cavity as much as possible, and, if the pulp is not fully exposed, wipe out the cavity with chloroform to remove fatty deposits from the cartilaginous layer of dentin, and dehydrate with absolute alcohol and warm air. Saturate a small pledget of cotton with a warm concentrated novocain (procain) solution in sterile water, place it into the prepared cavity and cover it with a large pledget of cotton, and then, with a piece of slightly warmed unvulcanized rubber which should completely fill the cavity, and with a broad-faced amalgam plugger or some other suitably shaped instrument apply slowly increasing continuous pressure from one to three minutes. The pulp may now be fully exposed and tested. If it is still sensitive, repeat the process. Loeffler states: "This pressure may be applied by taking a short piece of orange-wood, fit it into the cavity as prepared, and direct the patient to bite down upon this with increasing force. In this way we can obtain a well-directed regulated force of pressure, and with less discomfort to the patient and the operator."

Miller describes his method as follows: "After excavating the cavity as far as convenient and smoothing the borders of it, take an impression in modeling compound, endeavoring to get the margins of the cavity fairly well brought out; put a few threads of cotton into the cavity and saturate them thoroughly with a five to ten per cent. solution of novocain, cover this with a small bit of rubber dam, and then press the compound impression upon it. We obtain thereby a perfect closure of the margin, so that the liquid cannot escape, and one can then exert pressure with the thumb sufficient to press the solution into the dentin." Instead of the novocain solution, a so-called novocain "pluglet" may be used. A pluglet is introduced into the cavity, covered with a wisp of cotton dipped in sterile water and the further procedure is precisely the same as described above.

2. *Devitalization of the Pulp when Covered with a Thick Layer of Healthy Dentin.* With a very small bibeveled drill bore through the enamel or direct into the exposed dentin at a convenient place, guiding the drill in the direction of the pulp chamber. Blow out the chips, dehydrate with alcohol and warm air and apply the hypodermic or high-pressure syringe, provided with a special needle, making as nearly as possible a water-tight joint. Apply slow, continuous pressure for two or three minutes. With a bur the pulp should now be exposed, and if still found sensitive the process is to be repeated. As an anesthetic solution for this purpose a five per cent. solution of novocain in sterile water is recommended; or a wisp of cotton saturated with the same solution or a moistened novocain pluglet is placed in the hole, covered with dry cotton and a piece of unvulcanized rubber and pressure is made with an instrument that will just about fit into the opening.

Within recent years a number of complicated syringes, variously known as high-pressure syringes or obtunders, have been advocated, based upon the principle of forcing anesthetic solutions through sound tooth substance with intense pressure. This conception of pres-

sure anesthesia is erroneous. Close contact of the anesthetic fluid with the dentinal fibers, plus the necessary time for conveying the absorbed anesthetic *via* the 'Tomes' fibers to the nerve endings, explains the phenomenon very plausibly. A strong metal syringe, provided with a specially prepared needle to make as nearly as possible a water-tight joint, is all that is required. Those who prefer a special high-pressure syringe for such purposes may purchase any one of the many devices that suit their fancy.

In teeth not fully calcified and in so-called "soft" teeth, pressure anesthesia produces most satisfactory results, while the process fails in teeth of elderly persons, inveterate tobacco chewers, worn, abraded, and eroded teeth with extensive secondary calcific deposits, teeth whose pulp canals are obstructed by pulp nodules, teeth with metallic oxids in their tubules, teeth with leaky old fillings, badly calcified teeth, mainly all from one and the same cause, namely, clogged tubules. In most cases no amount of persistent pressure will prove successful.

According to Hertwig the protoplasm of the cell primarily transfers irritation and, secondly, transmits absorbed materials, and therefore the anesthetic solution has to pass through the entire length of the dentinal fibrillæ before the nerve tissue of the pulp proper is reached. Consequently a certain period of time is required before the physiologic effect of the anesthetic is manifested, and this period of latency is dependent on the thickness of the intermediate layer of dentin. The successful anesthetization of the pulp depends largely on this most important factor of allowing sufficient time for the proper migration of the drug.

Other soluble local anesthetics, such as nervocidin, erythrophlein hydrochlorid, quinin and urea hydrochlorid, etc., have been advised at various times as reliable pulp anesthetics. Owing to numerous drawbacks, these drugs have never obtained popularity. Refrigerant local anesthetics have also been advised for the extirpation of the pulp. The ap-



plication of this group of anesthetics for such purposes is usually accompanied by many disadvantages which materially limit their usefulness.

#### DESTRUCTION OF THE PULP BY THE ACTUAL CAUTERY OR A POTENTIAL CAUSTIC.

Devitalization of the pulp by the actual cautery or a potential caustic has been in the past more freely used than any other method. Before entering into a discussion of the various procedures employed in their application it is probably not amiss to rehearse their pharmacologic action.

Caustics, sometimes called escharotics, are substances which destroy living tissue by virtue of their coarse chemical or physical action, affecting organized as well as unorganized albumin. The older medical lexicographers restricted the term escharotic to substances which produce a dry, more or less insoluble, protective slough. They further differentiated between the actual cautery, *i.e.*, the red-hot iron and the potential cautery, *i.e.*, an agent, like silver nitrate, which forms an eschar without the agency of actual fire.

In the early days of the practice of conservative dentistry, as Fauchard, Bourdet, Hunter, Koecker and others inform us, the actual cautery was freely employed for destroying the "nerve" of a tooth. The method utilized for this purpose was practically the same as that employed by Koecker for "burning the nerve." At present the electric cautery is very rarely employed, while the potential caustics, such as nitric acid, silver nitrate, "spirit of salt" (hydrochloric acid), which were also recommended, have only a limited usefulness. In 1833 Wood advocated the use of crude arsenic (flystone, ratsbane, or native cobalt bloom) for the destruction of the dental pulp. Three years later, in 1836, Dr. Shearjashub Spooner, of New York, published an excellent little book entitled "Guide to Sound Teeth, or a Popular Treatise on the Teeth," in which he recommended to the dental profession

for the first time the use of arsenic trioxide for the above purpose. It is stated that Dr. Chapin Harris of Baltimore used arsenic in 1835 without having knowledge of Spooner's discovery.

#### ARSENIC TRIOXIDE USED FOR PULP DEVITALIZATION.

The original description of the introduction of arsenic trioxide for the destruction of the dental pulp by Spooner is, from an historic point of view, most interesting and is found in his book above referred to.

The specific action of arsenic on the tooth pulp may be epitomized as follows: If applied to an exposed normal pulp, it is readily absorbed. Pronounced hyperemia and, consequently, increased pain are the early manifestations of the arsenic action. "The walls of the capillaries are exceedingly delicate, being formed by a single layer of endothelium, which is a continuation of the endothelial lining of the arteries on the one side and the veins on the other." (A. Hopewell-Smith.) The endothelial coat of the capillaries is quickly corroded, causing multiple hemorrhages. Destruction of the blood plates, *i.e.*, plasmolysis and plasmorhexis, immediately follows, resulting in granular detritus. Thrombosis and stasis are the direct sequences. The connective tissue fibers and the odontoblasts are but little altered. The primary point of attack on the nerve centers is located in their endings, causing a destruction of the myelin and a more or less pronounced neuritis results; the latter is usually followed by complete cessation of all pain. The pronounced disturbances of nutrition finally result in anemic collapse and shrinkage of the entire pulp mass.

On pathologically altered pulps arsenic acts very much in the same manner, but decidedly slower depending largely on the stage of inflammation and the character of the exudate. An existing neuritis is always markedly increased. Depending on the vascularity and the size of the pulp, and the quantity used, from a few hours to two to



five days are usually required for its progressive destruction. Strangulation of the pulp about its apical end, resulting from the intense hyperemia brought about by the action of arsenic, is not the direct cause of its death. In teeth with undeveloped roots, and in those with partially absorbed roots, strangulation is very doubtful. Since the introduction of arsenic trioxid for the purpose of destroying the dental pulp many substitutes have been advocated, but none have so far superseded it or taken its place. Aside from the application of local anesthetics by special methods, arsenic trioxid is still the most universal agent employed for the above purpose. Usually it is applied in the form of a paste, sometimes as arsenical fibers or disks and as a dry powder.

Prior to the application of arsenic, the cavity must be excavated, as arsenic will not act through carious dentin, and, if possible, the pulp should be exposed and thoroughly depleted either by puncturing the organ or by applying vasoconstrictor drugs. Lavage has been recommended for this purpose, *i.e.*, washing the pulp with lukewarm water, changed slowly to cold water. Quicker results are, however, obtained by applying epinephrin chlorid solution under pressure. The cavity must be free from blood, to prevent the formation of inactive arsenic hemoglobin. If the pulp is inflamed and painful, it is absolutely necessary to apply suitable sedative remedies to relieve the conditions before the paste is applied; an inflamed pulp materially hinders the ready absorption of arsenic, and continuous severe pain is certain to follow. A solution of novocain or chloretone in oil of clove is serviceable for this purpose. These remedies, if sealed into the cavity, usually alleviate the condition in from twenty-four to forty-eight hours. If pus is present, it must be drained off. Pulp nodules occasionally obstruct the ready diffusion of the chemical. Removal of these calcareous deposits by means of sulfuric acid or by a drill, after pressure anesthesia has been applied, is indicated.

Cocain should never be applied cataphorically under these conditions, as the electric current may drive the previously applied arsenic through the apical foramen into the soft tissues. Occasionally one meets a patient who presents an unexplained idiosyncrasy to the action of this chemical.

The cavity for the reception of the arsenical application should be of ready access, and so prepared as to easily retain the temporary filling. The arsenical compound is preferably placed in direct contact with the freely exposed pulp by means of a blunt instrument, or on a depressed metallic disk or a piece of cardboard, or on cotton or spunk. Close contact insures quick action. Arsenic will act by omosis, although slower, through any thickness of dentin. This very fact is the reason why its use as a remedy for hypersensitive dentin has been abandoned: death of the pulp is invariably the sequence of such procedures. Some operators prefer to cover the arsenical dressing with an immediate film of plain or oiled paper, or a pledget of cotton.

The final sealing of the cavity consists of a temporary filling of cement or of gutta-percha preparation. Extreme care should be exercised in this simple, yet most important operation. Cotton fibers mixed with sandarac or mastic varnish, to be used as a retaining medium, should be avoided; they readily become foul in the fluids of the mouth, or they may leak, and, besides, they swell, causing pain from pressure on the pulp. Kirk has advocated the use of surgeon's rubber plaster where but a portion of the tooth is left, carrying it around the tooth; it will adhere satisfactorily for several days, or long enough to accomplish the object. The gutta-percha preparations are the best media for a temporary dressing seal; most experienced operators agree that a cavity correctly sealed with this material offers less possibilities for the seeping through of the drug than various cements or other materials. In applying the temporary stopping it is very essential to

avoid pressure on the dressing. In proximal cavities, where overhanging tooth substance prevents ready access, and therefore presents danger of displacing the arsenical dressing, gutta-percha packed between the two teeth is of service.

The quantity of arsenic necessary for the destruction of a pulp is very small. A careful estimation based on diverse weighings of quantities of arsenical paste as employed by several practitioners in their routine work has shown that the average application weighs about 1/30 grain (0.002 Gm.). It is not only useless, but decidedly dangerous, to employ more. Other writers have estimated the amount as varying from one one-hundredth to a twenty-fifth of a grain.

In deciduous teeth, and in those of young persons where the roots have not fully formed, the arsenical paste should be left in the cavity only a few hours. Many practitioners are opposed to its use in the teeth of children. More than two teeth should not be subjected to the treatment at one sitting, to prevent a possible chance of an accidental swallowing of a large amount of the poison.

The time required for the destruction of the pulp with arsenic depends on many circumstances. In the young, on account of the great vascularity of the organ, from four to eight hours are usually sufficient. In people of mature age it is best to leave the application *in situ* from three to four days. This allows ample time for the breaking down of the entire pulp and its ramifications. Many pulps do not, however, require more than one or two days to succumb to the effects of the poison. After the arsenic has been removed it is well to seal an astringent into the cavity for twenty-four hours, it will greatly facilitate the ready removal of the pulp *in toto*. Occasionally it will be found that in the removal of the pulp the apical half is still very sensitive to the touch. If it becomes necessary to again apply arsenic in the root canal, a very small quantity of the paste carried on the end of a barbed broach, which is quickly thrust into the pulp stump, should be employed.

#### PRECAUTIONS IN THE USE OF ARSENIC.

The following important facts should be remembered when an arsenical compound is used for the purpose of destroying the pulp:

1. Only the smallest possible quantity which will kill the pulp should be used.
2. Arsenic should never be applied on a severely aching pulp.
3. On teeth with partially absorbed or with undeveloped roots the arsenical paste should remain only from four to six hours.
4. If possible, the paste should be applied on a freely exposed and depleted pulp.
5. A retaining seal must be applied without pressure and with the utmost care.

#### TOXIC EFFECTS OF ARSENIC.

Local toxic effects in the mouth are most frequently met with as the result of faulty application of the chemical for dental purposes. Leakage of the dressing seal is responsible in most cases, and contact of the mucous membrane with instruments accidentally carrying small particles of the paste, or the unnoticed squeezing out of arsenic resulting from pressure applied on placing the retaining stopping, are possible factors. The fact that arsenic trioxid is odorless and tasteless increases this danger, which usually is recognized only after the mischief is done. Numerous cases of severe forms of toxic periostitis, followed by necrosis of the alveolar process, and loss of one or more teeth, are on record.

Arsenical intoxication of the gum tissue presents in its early stages all the phenomena of true inflammation. Later the surfaces become denuded and assume a raw ham color; the veins are distended, the border of the infected area is raised and shows a loss of substance in the depressed center—the typical picture of an ulcer. Usually there is a pronounced metallic taste present in the mouth. Arsenic penetrates very deeply, destroying the soft and hard tissues, which finally results in true necrosis. In the early stages the affection is not painful, but



as soon as the deeper structures are reached severe pain is manifested.

The treatment depends on the severity of the poisoning. Simple intoxication requires the immediate removal of the cause and mild antiseptic mouthwashes. If necrosis has set in, the affected parts must be thoroughly curetted with a large spoon excavator; if the bone has been sequestered, it must be removed. Local anesthesia is usually serviceable for such work. The denuded surface is covered with a suitable surgical dusting powder. Rigid antisepsis is of prime importance. A warm physiologic salt solution used at frequent intervals is indicated as a mouthwash. The local application of dialyzed iron as an arsenical antidote is indicated only if arsenic is present in substance on the tissues; after it is absorbed, this solution is useless.

#### REMOVAL OF THE PULP.

The removal of the anesthetized or devitalized pulp should always be done under strict aseptic conditions. The preparation of the field of operation and the sterilization of the instruments should be carried out and the general technique of the procedure is practically the same as that employed in the removal of gangrenous pulp débris.

#### SUMMARY OF EXTIRPATION OF THE VITAL PULP.

1. Apply rubber dam and wash off teeth and adjacent dam with alcohol and dry.

2. Remove all food débris and softened dentin from the cavity as far as it is expedient to insure exposure of the pulp. (If the pulp is covered with a thick layer of healthy dentin or if the tooth under consideration is sound, an opening is made into the enamel or into the exposed dentin with a small bibeveled drill.)

3. Sterilize the cavity with a fifty per cent. solution of thymol in acetone.

4. Use pressure or local anesthesia.

5. Thoroughly excavate all decay from the cavity.

6. Open the pulp chamber with sterile sharp burs, until direct access is obtained to all canals. (During this operation the bulbous portion of the pulp usually will also be removed.)

7. Wipe out pulp chamber with alcohol.

8. Extirpate pulp from root canals.

9. Wash canals with sterile water until hemorrhage ceases.

10. If convenient, a freshly sterilized diagnostic wire is inserted and a radiogram taken at this time.

11. Dry canal and insert a sterile paper cone moistened with dichloramin-T.

12. Seal with temporary stopping.

13. Root canals should be filled within twenty-four to forty-eight hours; *never* immediately.

40TH AND SPRUCE STS.

(To be continued.)



## CORRESPONDENCE

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### "Vincent's Disease."

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TO THE EDITOR OF THE DENTAL COSMOS:

*Sir*,—So much is appearing in the dental magazines lately about "Vincent's Disease" that I wish to add a word as to its treatment. Along about 1910 or '11, in an address to the El Paso County Medical Society, I had the pleasure of mentioning sodium perborate as a proper and effective remedy for this troublesome disorder.

Sodium perborate—not to be confused with sodium biborate—is such a simple, harmless, but efficient remedy for "Vincent's" that here we look upon it as a specific. A teaspoonful in a half glass of water used frequently—the oftener the better—as a mouthwash and gargle.

The air-driven spray helps the solution to reach inaccessible places. Fre-

quently after the acute stages, general prophylactic measures of scaling, etc., are necessary, and if the condition becomes chronic oftentimes local foci will need treatment with carbolized iodine, trichloroacetic acid or a similar drug. I believe all this can be safely left to the good sense of the operator; the sole object of this communication being to call attention to sodium perborate as a remedy for "Vincent's Disease," as it "works almost like magic."

If you can find space to give publicity to this remedy, I believe you will confer a blessing on many who suffer needlessly from this dread disease.

Yours truly,

HENRI LETORD.

EL PASO, TEXAS.

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### "Necrosis of Mandible Caused by Extraction of Abscessed Tooth."

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TO THE EDITOR OF THE DENTAL COSMOS:

*Sir*,—Permit me to express my idea regarding the case mentioned by Dr. W. C. Miller of Augusta, Ga., in the DENTAL COSMOS for May 1920.

I do not think it scientific for anyone to say that the extraction of an abscessed tooth could cause necrosis of the mandible or the maxilla. Most abscessed

teeth can be removed successfully when the patient presents. The idea of an abscessed tooth causing necrosis only when it is extracted is not scientific, and should be branded as such.

I suppose the extraction was a surgical one, in the case mentioned.

J. B. MILLS, D.D.S.

OZARK, ALA.

# PROCEEDINGS OF SOCIETIES

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## Academy of Stomatology of Philadelphia.

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Regular Meeting, Tuesday, November 25, 1919.

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THE meeting was called to order by the President, Dr. Salvas, at 8:15 P.M.

After the transaction of some routine business, including nomination of officers, the President called upon Dr. ARTHUR D. BLACK, of Chicago, to address the Academy on the subject of "The Pathology and Treatment of Diseases of the Peridental Membrane."

[This paper is published in full at page 820 of the present issue of the DENTAL COSMOS.]

### DISCUSSION.

**Dr. Hermann Prinz, Philadelphia.** *Mr. President, Dr. Black, Ladies and Gentlemen,*—This comprehensive paper of Dr. Black's tells its own story and this is especially true in regard to the excellent illustrations. I am glad to know that he has finally sifted the matter down to the fact that the treatment of pyorrhea in its severest form requires surgical procedures. At this point we are in perfect harmony. Dr. Black has referred at different times in his paper to two varieties of calculus, *i.e.*, salivary calculus and serumal calculus. Salivary calculus indicates that it is derived from saliva, while serumal calculus would indicate that it is derived from serum. The first statement, *i.e.*, the precipitation of calcium salts from saliva after the subcharge of carbon dioxid has evaporated, is quite generally accepted at present; while the so-called serumal calculus as a sequence of precipitation from

serum has as yet not been definitely established. On the other hand, precipitation of dissolved bone substance in pathological processes, such as occurs in suppuration of the alveolar process in advanced cases of well-established pyorrhea is quite common. This type of calculus, usually referred to as serumal calculus, is in reality a concoction obtained from pus subcharged, as stated, with calcium salts obtained from dissolved bone. All types of calcareous deposits about the teeth are virtually the same as far as their chemical nature is concerned, usually consisting principally of about ninety per cent. of calcium phosphate and ten per cent. of calcium carbonate. The density of these deposits, *i.e.*, hard and soft calculus, depends primarily on the length of time required for their deposition. The older the deposits get, the harder they will be. This is equally true in regard to color. The normal color of fresh precipitated deposits is of a light yellow tint. In time these deposits become brownish-black from pigments obtained from food débris and from decomposed blood.

A further most important point which Dr. Black has strongly emphasized and in which we heartily agree is that the detachment of the cementum from the peridental membrane in the pockets of pyorrhoeal teeth is permanent. Union of the two tissues will never occur, because the cementum is usually completely destroyed or it is sufficiently diseased that it will become necrotic. The peridental

membrane will not attach itself to exposed dentin without an intervening layer of cementum.

I wish especially to congratulate Dr. Black on the beautiful picture which he threw on the screen, showing the ingrowing epithelium into the pyorrheal pocket. Upon the destruction or removal of this epithelium hinges the whole secret of obliterating this pocket. Unless this removal is accomplished in a most thorough manner the pocket will never close. In such cases, in which the pocket is cleansed and treated at comparatively short intervals, the process of destruction of the alveolar process may be, to some extent at least, prevented, but it is certainly only a temporary abatement of the condition. The most rational procedure, as Dr. Black has pointed out, consists in surgically removing the ingrown epithelium with the underlying inflamed gum tissues. After the tissues have been locally anesthetized, they are cut away with suitable knives. Dr. Darby has been kind enough to make for me two such very delicate knives which resemble very much a cataract knife, only the handle is very short so that one may use them within the oral cavity. The complete removal of the diseased tissue is very essential, otherwise the pocket will never be obliterated. The simplicity of this operation and the uniform good results obtained therewith make it the most desirable treatment for these stubborn cases.

**Dr. Clarence J. Grieses**, Baltimore. *Mr. President, Dr. Black and Members of the Society*,—I once heard it said, and it provoked quite a laugh, that if you could not cure pyorrhea, you could always prolong it. I do not care to prolong this discussion, but I must use the blackboard and make some diagrammatic notes, so that you may understand my side of this situation.

I want to congratulate Dr. Black. I know something of the tremendous amount of work that he and his associates did in Chicago, because I was near them last winter and heard Dr. Hatton speak and I saw his elegant slides. I believe they have attacked this thing in the only

way, checking up clinical errors of the past by a real pathology—not only a cadaver pathology, but a living one, if that term is permitted; obtaining the tissue from a known lesion; and, as he says, following a line of treatment and studying the results of such treatment by histologic study of the actual tissue treated. So I wish him God-speed, for I have learned a lot tonight.

So in classification, that our minds may be clear, we have if you will allow me to so designate it, *Atrophic peridental disease*, for which there is no treatment—the clean gingival recession, with no caries and much erosion, but no “itis,” if you will allow that expression; the type we associate with certain phases of sodium and calcium waste. Then we have the type of *Hypertrophic peridental disease*, where the consideration of treatment begins this evening. Now in the hypertrophic type, there is a well-marked group that illustrates Dr. Black’s contention as to treatment, only in a different way. It is at first hypertrophic, and then rapidly destructive. That is the ulceromembranous type, the Vincent’s gingivitis, or “trench gums.” I have personally been a victim, and have had hundreds of cases under my care while in the service. In ulceromembranous gingivitis, even if caught in time and handled without instruments, we have a rapid destruction of gingivæ and the alveolar crests are cut to a line by organisms, not instruments, but with the same ultimate results that Dr. Black obtains with instruments. If you want to cut up tissues, there is no better way to accomplish it than to implant the Vincent’s bacillus. It will clean up the hypertrophic and purulent areas in short order, but no one can foretell where it will stop: it sweeps the tissue off on the same lines that we see after Dr. Black’s operation and leaves the patient unhappy ever afterward from food pack and trauma: that is what I should fear from this operation. So here we have a definite micro-organic form, producing a definite pseudo-membrane, and wiping out, regardless of type, all tissues on level lines. Radiographs will show no



deep irregular invasion along any line of perivascular lymph vessels, as in pyorrhea, but a rounded edge to the crests, covered by muco-periosteum—everything cut away just as in this operation. I take it for granted that Dr. Black did not mean to operate on this type of case because he spoke of the purulent type; but that he has been sadly misunderstood I also know, for I have seen really dreadful results following attempts to do this operation in a mouth involved by even a slight periodontal Vincent's.

The next is the hypertrophic granulating type without exudates. I do not believe, nor agree with Dr. Black, that a deposition of any amount of even salivary calculus of any kind occurs, impinging on the gingival crests, without definite infection. In other words, I cannot follow Dr. Black in the classic sequence, found in the textbooks, of irritation, inflammation, and then infection in any abrasion occurring in the mouth. I have found it difficult to define irritation and inflammation even in the laboratory and yet rule out infection; and I am surely in accord with authority, in that I feel there must always be slight trauma, operative, or calcic, or food trauma; or some predisposing systemic condition involving the end circulation, before we can have a true gingivitis. I believe that in the mouth, irritation, inflammation, and invasion of organisms are so closely linked as to be indistinguishable. So I could not say that salivary calculus is only a result and not a cause of this type. We find it at the crest and under the gingiva; hence I do not agree that salivary calculus does not quite often produce a granulating infective area, with or without exudates.

The next group contains the true exudative types: first, the sero-fibrinous, and later the purulent phase, usually accompanied by serumal calcic deposits, but not always, for to my mind many phases of this disease, and possibly the more dangerous half, occur without any cemental deposit. I should like Dr. Black to tell us whether he excises all of these. The sero-fibrinous exudation does not progress from deep pockets, as

does the purulent form. I have followed the idea of Dewey and Noyes in regard to the lymph supply as the primary pathway in all periodontal disease and have associated the non-hemolyzing streptococcus with the granulating phase and the hemolyzing streptococcus with the sero-fibrinous cases. I think it should be emphasized that this exudative type, without pus and with or without serumal deposits, is the most dangerous form and much worse than the true pus type, as a portal for systemic invasion. I should like to know whether Dr. Black would excise these cases? Then we come to the straight pus type, with or without deposits, which in my opinion is a secondary infection, generally by staphylococcus. These types follow in sequence or stop at any stage right down this line (referring to diagram)—first, hypertrophy and granulation all productive phases; then, destructive; finally, ending in a true chronically purulent lesion. I think the profession has recognized pyorrhea without deposit as the most difficult to treat, and this is the type in which I think sweeping excision, according to Dr. Black's method, may effect a cure.

I should like to say a word about the patient and probable results. Dr. Black has very ably described the three sources of periodontal blood supply, also the three lines of perivascular lymph vessels, which follow that blood supply through the membrane. One passes over the alveolar crests; a second dips down into the membrane; one enters the alveolus midway, passing through from tooth to tooth, and finally the apical group which passes up through the membrane, as the lymph vessels pass down, and follows the long axis of the tooth. Now any deep incision of the gingivæ will cut along the lines of two groups of these vessels, exposing much vascular lymph surface to mouth infection, and if you will notice the diagram, we will still have left a granulating surface which we had before operating, because all gingivitis is marked by deep irregular invasion of the alveolus by granulating tissue preceding the purulence. There

is a tendency to laugh at the periodontologist: I do not join in that laugh, for he has been a great help to me. My patients have gone to many such men, and I have to thank them. My patients do not have to "go back every month," as has been rather facetiously said, and the disease is controlled. So I have great faith in the scientific scaling and cleaning of cementum and the little clean blood clot operation that the periodontologist does. I believe cementum can be pus-soaked for a long time before it is completely infected, and I think that the outer layer can be successfully removed, particularly if we have a vital pulp. Even granting that forty-eight per cent. of these pulps are involved, as Henrici and Hartzell state, the operation that some of these men do will produce an epithelial lining, which I know in my own case has come down into the pockets protecting the treated teeth, which get firm. I am not saying that new bone or peridental membrane is formed; that may not be possible, but I know much tissue was saved, which by Dr. Black's operation would have been sacrificed. I want to repeat, if we cut below the purulence you still have another layer of granulation tissue. Cutting this off and obliterating the pus pocket does not remove all granulation tissue in the pocket which is as irregular as the vessels. I would prefer that as careful curetment be done on the cementum as possible, so that this bunch of vessels (referring to diagram) may be given an opportunity to produce regeneration, even granted the tissue is invaded there by infection. Periodontologists necessarily work slowly; that to my mind is "only fly in the ointment" for you cannot get enough good men to go around. It is just like the real modern technique of treating pulpless teeth in dispensary practice; you cannot do it all; it is like sweeping back the ocean. If this treatment of Dr. Black's will help out the great group who cannot be attended in any other way, it is a great godsend, just as the extraction of myriads of pulpless teeth, many of which could have been saved were there time

and technique, has no doubt cleared out the abscessed teeth, thereby preventing serious systemic disease. I do not think that this treatment should be applied by young, inexperienced practitioners, who are just the ones that will take to it, because it is so easy and there lies the danger.

I thank Dr. Black. I think he has brought us something to apply in dispensary practice in such cases; but I should not like to have it done in my mouth, if a real periodontologist, who had the facilities to take care of my teeth, were at hand.

**Dr. William Ziesel**, Philadelphia. I should like to say a few words on the subject. I have learned a great deal from Dr. Black, and I want to say that I am thoroughly in accord with him in regard to the treatment of this condition in general. During the past year I have treated five hundred teeth in a manner similar to that Dr. Black speaks of.

I hold in my hand here a paper on the subject of pyorrhea extermination, which I wanted to read at the meeting of the National Dental Association at New Orleans. I was prepared to do so, and had my cuts made. Thinking that I was presenting something entirely new to the profession, I went to Dr. King, Secretary of the National Dental Association in New Orleans, and laid what I had before him.

He said, "That is old; we have been doing this for two years and Dr. Black has been doing it longer." I said, "Where has he published his technique?" He did not tell me. I hold in my hand tissue, preserved in alcohol taken from fourteen teeth in the manner that Dr. Black speaks of.

I have been practicing this technique for a year, gradually developing it from one tooth at a time until I now have developed it to ten teeth. It is the only way to treat pyorrhea and cure it. If you do not believe it, you will have to come to it some day.

Here is a picture of the tissue removed from the fourteen teeth mentioned. This is the picture of a man sixty-four years old, who had twenty-five



teeth with pus coming out at the margin of the gums of all of them. I operated upon the teeth of this man, who had been recommended to me by a physician; and in five operations, performed within eighteen days, cured him. I have the affidavit of the physician relative to his condition in this paper, but of course cannot read it tonight. I should, however, be glad to do so some other time.

Of these teeth, there is not one that has any infection. I have spent less than five minutes, on an average, on each of these teeth.

This is the picture of the man and this is the X-ray of the mouth (exhibiting photographs) in which two-thirds of the bone has been absorbed; yet, in fifteen minutes' operation, these six lower teeth were brought around.

Dr. King was kind enough to say, that the program was too full to allow me to present my paper, but stated that Dr. Black would claim priority on this operation. His paper and mine are very similar.

Dr. Smith, chairman of the Section on Oral Surgery, read my whole paper through. Dr. Black, did you communicate with Dr. Smith? Did he say anything to you?

**Dr. Black.** No.

**Dr. Ziesel.** Didn't Dr. King communicate with you about the paper I had written?

**Dr. Black.** Yes.

**Dr. Ziesel.** That is all I have to say.

**Dr. R. H. Ivy.** I should not care to argue the case in question with Dr. Prinz, but I think I have evidence to show that saliva is not the only source of deposits of calculus. This morning, I removed an unerupted molar, which I found covered in part with a definite calculary deposit, showing that inflammatory reactions had something to do with the deposits, because the tooth was not in communication with the saliva.

**Dr. Chas. S. Tuttle.** Dr. Black, particularly in the lantern slides, showed us conditions of the lymphatic system and then allowed the subject to drop. I hoped that he would go on. It is intensely interesting to note that in some

cases of infection, where it has been necessary to extract teeth or excise the end of a root, we have afterward been able by palpation to discover that the lymph nodes and lymphatic system had taken up this infection. Adami, after referring to hundreds of writings, speaks of subinfection. I should like to have had Dr. Black speak of this in connection with the removal of pathological tissues.

**Dr. W. A. Jaquette,** Philadelphia. The large attendance of the members of the Society shows their appreciation of Dr. Black's coming, and I know that the membership will feel it is worth while to show to Dr. Black that appreciation. He has not attempted to give all the etiological factors in the development of pyorrhea.

I am not qualified to speak on this operation, as I have not performed it. You will see that it differs from Zentler's operation, which we know is not really his at all; but he has been instrumental in spreading it. That is done by turning back the soft tissues, making a more surgical curetment of the roots, and then suturing. Of course that is a different operation. It is only a means to obtain thorough removal of calculus. I have no enthusiasm for this operation as outlined by the essayist. I should regret the society's giving up the great benefit that may be attained by removing causes and an improved surgical curetment of the roots. We have all seen cases where there was absolute elimination of the pus flow following purely the correction of the traumatic occlusion. We have seen teeth about which there has been a definite flow of pus; we have removed the cause of irritation and in a week's time, without any surgery or therapeutic remedies applied in these cases, the flow of pus has ceased. We know by this that the flow of pus has been largely made possible by the extra burden that these teeth have been called on to bear. By removing just a portion of this burden the inflammation would subside. When you remove the other portions by curetment, the tissues return to a state that will give comfort for



years, and additional stability to the tooth. So while I am not able to discuss this operation, I should regret a widespread adoption of it.

**Dr. Black.** I have enjoyed this discussion very much. I wish first to say a word with regard to the statements made by Dr. Ziesel, who spoke of having been at New Orleans with his paper. The last thing that he said might have given the impression that he thought I had gotten some of my ideas from him.

**Dr. Ziesel.** No; Dr. King accused me of taking something that someone else had done.

**Dr. Black.** This operation has been done before either you or I was born.

**Dr. Ziesel.** Well, no one knew of the importance of it.

**Dr. Black.** I thank you for your corroboration of the results, but I just wanted to clear that idea up before the Society. For Dr. Ziesel's information, I will say that he will find this in my father's book on "Special Dental Pathology" published in 1915. He will find record of lectures and clinics given on the Pacific Coast by myself at the invitation of the University of California in 1916, and many articles in our dental periodicals.

**Dr. Ziesel.** You did not realize the importance of it then, did you?

**Dr. Black.** I would like to say a word regarding deposits of calculus. We have all seen calculus on the apices of roots, in cases of chronic alveolar abscess, where there has been no opportunity for the deposit to come from the saliva. Regarding the conditions by which the deposits of salivary calculus occur, I would call attention to the fact that all microscopic examinations of both fresh, soft deposits and old, hard deposits show nothing but rounded forms; there are no crystal forms as would be the case if the salts were precipitated from the saliva.

It seems to be a logical conclusion that the calco-globulin in the body fluids may be thrown out through any of the excretory channels, as the saliva, urine, bile,

etc. It may be difficult to prove, but it seems to be the best explanation we have of the occurrence of the deposits.

As to the travel of infection from the deposit of salivary calculus, referred to by Dr. Grieves, I think that I did not make myself plain in regard to this. I quoted Dr. Noyes as saying that it seemed to him that the infection from the area under the shelf of the deposit of salivary calculus appeared to travel along the perivascular lymphatics on the outside of the alveolar process rather than along those of the peridental membrane. If this is so, it explains the general absence of the formation of pockets in connection with deposits of salivary calculus.

As to the diminution of the blood supply by cutting away the overlying gum tissue to eliminate pockets, I wish to remind you of the lantern slide of the section of tissue which was cut away. There are, doubtless, minute bloodvessels in it; but none can be made out without a very high power, as practically all of the vessels of any size had been destroyed. We have examined hundreds of these specimens and the rule is that the bloodvessels have been quite generally obliterated.

There seems to be no question but that the tissues are infected and considerable changes have taken place farther apically than the line at which we cut the tissue away. However, I see no reason why the tissue may not recover in those areas in which there remains an attachment of the fibers of the peridental membrane to the surface of the root.

I did not discuss acute ulcerous gingivitis, because it is so distinctly different; and I have not seen cases in which the after condition of the gums was similar to that following the operation of cutting the gum tissue away. There may be much tissue destroyed, but in a very uneven, ragged way. In eliminating pockets, we should attempt to reproduce the condition seen in the mouths of older people, in what has been called senile absorption, in which there is a general recession of the gingivæ and

alveolar processes. The line of cutting should be in as long a curve as possible, without deep notching.

Dr. Grieves raised the question of the types of cases in which I would operate. I would have the least hope in those cases in which the peridental membrane has been destroyed without an apparent cause; cases in which the cause is more likely systemic than local. Most of these have gone from bad to worse, no matter what treatment I have employed. In most of the cases in which a local cause of the pocket can be made out, and these constitute probably ninety-five per cent. of all, I would expect to get a much more satisfactory result than by any other method of treatment.

In cases in which the pockets are very shallow, if the deposit is removed, there may occur a slight recession of the gingiva; and the case will go along indefinitely without further treatment. As these pockets become deeper, the problem of curetting and treating them by the irrigating method becomes more difficult; the indication for this method of operation is greater.

From what Dr. Jaquette said, I judge he must have thought that I treat all cases in this way. That is not so. Very shallow pockets are frequently treated by scaling and irrigation. Patients are trained to irrigate pockets twice daily at home. Pockets on the labial surfaces of upper front teeth may not be eliminated in many cases on account of the bad appearance of the exposed roots. Lingual pockets, particularly about the upper teeth, are generally not favorable for this operation.

There is one method of treatment that has not been mentioned, and that is the extraction of teeth. I extract many

more than I used to. I think that many of us should extract more than we do.

**A Member.** After you extract the teeth in pyorrhea, do you find that, unless you do a curetment, the trouble still goes on? What has been your experience without curetment, and only extraction?

**Dr. Black.** I have not done curetment in such cases. I do not, as a rule, curet after extraction of teeth loosened by chronic pericementitis. So far as ocular examination goes, the tissues seem to heal; and my belief is that the tissues easily overcome the infection which remains.

**Member.** Would you tell the Society how you reduce the sensitiveness of the cementum after operation?

**Dr. Black.** I have had but two cases in which there was sensitiveness afterward. I usually tell patients that their teeth may be slightly sensitive to heat and cold for a few days, and when they return I ask them whether they found this to be the case. They generally reply: "No," or "Only a little." In one case in which I cut away the tissues from the lower incisor region, the teeth were tremendously sensitive afterward. With a rubber dam in place, I applied pulverized silver nitrate to the teeth, and the sensitiveness was relieved. It will control the sensitiveness. We do not often do this operation in positions where the discoloration of the cementum would be noticed.

I wish to express my appreciation of your interest in this subject, as manifested by your remaining so attentive through all this discussion.

A vote of thanks was given to Dr. Black and Dr. Grieves, on motion of Dr. Lewis.

Adjourned.



## Pennsylvania State Dental Society.

Fifty-second Annual Meeting, held at Reading, Pa., April 27-29, 1920.

### TUESDAY—*Morning Session.*

THE fifty-second annual meeting of Pennsylvania State Dental Society was held in Reading, Pa., April 27 to 29, 1920.

The convention was called to order by the president, George S. Schlegel at 11 A.M., on Tuesday, April 27th.

Rev. Dr. Charles R. Creitz offered an invocation.

THE PRESIDENT. In one of the bulletins issued by the Local Committee on Arrangements there was a reference made that Reading is a city that needed no boost. While perhaps you believe that, we want to assure you of the fact, and therefore we have asked the Honorable Mayor of Reading to come here today to address you and tell you why Reading needs no boost. Therefore I take great pleasure in introducing to you Hon. J. K. Stauffer, the mayor of Reading.

### Address of Welcome.

By Hon. J. K. STAUFFER, Mayor of Reading.

*Mr. President and fellow citizens of the State of Pennsylvania*,—It is a great privilege and a special pleasure for me to stand before you professional men of the State and bid you welcome to the third industrial city of the State of Pennsylvania. You represent a profession; you are men who are doing so much for the comfort and health and safety of the present generation that I feel it is a special privilege to have you here, because I feel that you should be highly honored in your day and generation rather than after you are dead and gone,

and it is proper that you should be. In my work as a councilman in the City of Reading in the past years one of the most interesting bureaus which I had to supervise was the Bureau of Playgrounds. We have eleven playgrounds in the City of Reading for the children and forty-five instructors and fourteen thousand children to get the benefit of this work. Although I had some acquaintance with public affairs before that, my idea of public service changed when I saw these fourteen thousand children, who are to be fourteen thousand citizens if their health is spared and they grow up to manhood and womanhood. Just yesterday afternoon I had the very great privilege of accompanying your president and some other members of your association, and some of his close associates, to see an oral hygiene demonstration in one of our school buildings. At this time I want to say to you I was very much impressed with the necessity of such work for the children in the public schools. I want to say if there is anything that I would like to give a boost to, that I would like to get before the people of Reading, it is just that work which we looked at yesterday in that oral hygiene demonstration. Its importance cannot be overestimated. It is a wonderful thing for the people of any community to have a service of that sort, whether it is a rural community or a great city.

In looking over these pictures on the stage [referring to some photographs of wounded service men in the great world war who have received the benefit of maxillo-facial surgery] to a layman's mind there is something horrifying in those extreme examples, but I find they



are all things that belong in your profession, and it gives me an impression of appreciation of the work you men and the others in your profession are doing, and that you are devoting your lives to the alleviation of the sufferings of your fellow human beings. I remember as a boy, Mr. President, a time when I was very much interested in reading Indian stories, and I recall the statement that there was only one thing that could hurt an Indian and that was toothache. I rather believe that that ought to be understood as being very true about a lot of others besides Indians, because any man or any woman, or any human being, is certainly helpless when it comes to toothache, and unless one of the members of your profession is at hand to locate the seat of the trouble and remedy the condition, anything short of pulling the tooth, which cannot always be done with expedition or without pain, is sure to make each one feel how dependent he is upon the profession that you men here today represent.

With these words of appreciation of the work you are doing I think perhaps I may be pardoned for saying something about the City of Reading, to which you have come and of which I have the honor of being the executive at the present time. No doubt many of you, perhaps all of you, have been here before, and it is not necessary to go very much into detail in regard to the advantages of the City of Reading. I want to say that the present administration of our city is a booster administration. We want you to have a good time and see the city at its best. Later in the season you would see it to still better advantage, in the early summer time, with blossoms and shrubbery on every side, and you then would be still more impressed with its landscape beauty. We hope that you will carry away good impressions of Reading as being a normal city, and I hope that when the day comes when you are in other places you will have only the most pleasant thoughts to report about Reading, and that you will urge other citizens of the State and of the country to come here and visit us. That Reading is the

third industrial city of the State entitles us to some consideration from the citizens in other parts of the State, and it is also a well-known fact that it is the fourth in population in the State of Pennsylvania, and that is something of which we are very proud.

But, gentlemen, to come back to your own profession, I hope this meeting here in this city today, addressed by men of your great experience and great ability in your line, who are doing splendid things in your profession, will have a powerful local influence in addition to the benefits you will derive for yourselves, and that through the publicity which your convention will have in our local papers, the people of Reading will come to realize the immense importance of the care of the teeth, and not only the adult people or people of all ages, but eventually that it will be of great benefit to the school children of the City of Reading and every other city in the country. I want the members of the profession to feel that I am interested in having a dental clinic and in having the school children's teeth looked after, for you will be doing it not for your own interests, but in the interests of humanity in general.

I believe in this case as in all others you men in the profession which you are practicing will find that it is good business, just good, hard common sense in a business way, to encourage this thought, that the children must have their teeth looked after. It might occur to some that this would take business away from the dentist. I do not believe that at all, I think the more you increase the wish for a high type of living the more the people are going to spend to achieve that wish. I believe that the dentists who are now very busy will be still busier if that is followed out. There are some dentists who are starting out, and who are not perhaps very busy just at the beginning, whose business will grow very much quicker through this publicity. I believe it is a very fair and reasonable thought that if children themselves get the idea that their teeth must be looked after, they will in a very

short time go to their parents from day to day and tell them, if it is the fact, that their teeth are not in perfect condition.

And that is what I believe these children are going to do in regard to oral hygiene in the schools. They will say, "Mother, I want my teeth attended to," because they have been told about it and they appreciate it, and will tell their parents what has been told them. That young woman, Miss Barry, who gave us the lecture yesterday, told the whole story, and I would like her to talk to all the people of Reading. I believe you can, if you will, take this up and impress upon the people the importance of good teeth, not alone as a teacher to the children, but as an adult to every man and woman, and the children will say, "When I am grown up I want to have good-looking and serviceable teeth." I believe it is going to be of financial interest to the profession as well as of great interest and benefit to any community and will aid in producing a better citizenship with less trouble from bad teeth.

I have been told that two former officials of the City of Reading, men who have served this community in an important way in high public positions, died as the result of bad teeth. I also knew very well a man who held a high position in Washington, and it was said of him that his death was directly attributable to bad teeth. I am sure the advertising that this subject is getting throughout the country is going to do much in the interest of health, and much in the interest of happiness for everybody, and I believe that you men are doing perfectly wonderful work in having meetings of this sort with such exhibits as these we have here upon this platform, where the layman can come and see what you are doing. I want to say to you, "God speed," good luck to you in your meeting here and in your work at home, as I feel that you have the right to the title of "Benefactors."

THE PRESIDENT. We will now hear a response to the address of welcome by Dr. Charles R. Turner.

### Response.

By Dr. CHARLES R. TURNER.

*Mr. President, Mr. Mayor and ladies and gentlemen,*—In the small town in the South where my boyhood was spent one of the functions of the mayor, and the chief one, was to serve as judge in the police court. You can well imagine that it was not good form, therefore, when a mayor spoke to you in his official capacity to answer back, but, Mr. Mayor, your words are so cordial and your greeting so sincere that I am indeed obliged to answer back. My friends whom I represent would have me say to you, Sir, that we appreciate very greatly your cordial welcome. We are very glad to be now sitting in session in your fine city. We were very glad to hear you say that you wanted us to have a good time, because we could then take the point of view of the good Samaritan who, in a small village, lived next door to an old rascalion whom nobody liked. When he learned that the old fellow was approaching his death, unloved by any of his neighbors, the good Samaritan thought it would be unfortunate to have him pass out of the world without at least someone by his bedside to say a parting word. So he went to the house and was admitted to the sick chamber, and after some conversation he finally said to the old fellow, "Well, I suppose, my friend, you are reconciled to your end?" The old fellow said, "Yes, I am ready for my end." Then the good Samaritan said, "Well, I'm glad to hear you say that; that makes it unanimous."

It is no accident by virtue of which the Pennsylvania State Dental Society is meeting in Reading. The prestige of this city as a large industrial center in our commonwealth is well known, and it is also well known to have a history deep-rooted in the past, having the honor of having had among its citizens the ancestors of Daniel Boone and Abraham Lincoln, and also with the record of having sent the first volunteer company to respond to Lincoln's call for men in the Civil War. Such a city would not have to invite this society twice to meet



in it. While all of us may not bear so constantly in mind these things which I have just referred to in regard to Reading, yet all of us are quite sure to remember with a great deal of pride and a great deal of interest the fact that the dentists were the first to organize and conduct a volunteer public dispensary in the State of Pennsylvania. But, Sir, it is not for these sterner virtues alone that we like you. The cordiality and the unbounded hospitality of this city of the Pennsylvania Dutch appeals to us. We like your sauerkraut, and may I say, academically, we are interested in that very beautiful engineering feat which Reading has brought about and of which you spoke a moment ago, not to speak of another liquid which we have usually associated with Reading, and which we miss on this occasion.

We expect to enjoy ourselves though, Sir, because where there is a will there is a way. But though we are on pleasure bent in part, we do have a frugal mind, and it is our purpose in meeting here to profit by our sojourn as well as to enjoy it. The program which has been prepared for this meeting is one of the finest that we have had occasion to look over. I have no doubt whatever that each and every one of us who is here in attendance will go away immeasurably improved by what he has seen and heard. During the hours between the formal sessions we shall spend our time most pleasurably in enjoying some of the details to which you have referred as to the things to be seen in your city. In conclusion, on behalf of the association, permit me to thank you most cordially for your generous welcome.

THE PRESIDENT. Next on the program is the reading of the President's Annual Address. I will ask the First Vice-President to take the chair.

The First Vice-President, Dr. R. H. D. Swing, then took the chair.

Dr. SWING. President Schlegel will now present to you his annual address.

Dr. GEO. S. SCHLEGEL then read the annual address, as follows:

### President's Address.

By GEO. S. SCHLEGEL, D.D.S., Reading, Pa.

*Mr. Chairman and members of the Pennsylvania State Dental Society,—* The President's Address, viewed chiefly by reflection upon the addresses of the past presidents of this society for more than a decade, seems to be an agency for theoretical and practical recommendations for the society. A committee which subsequently discusses these recommendations reports that a few or all of them should be adopted; but in my final analysis of these resolutions I have found that most of them have died.

Therefore with this knowledge in mind, I shall try to be very precise in presenting to the society for its consideration only such matters as are of extreme importance and will be of benefit to our society, the entire dental profession, and the general public. Also I hope these recommendations will be taken seriously, and that proper and final action will be taken upon them.

### FRENCH-BELGIAN RELIEF.

At the last meeting of Council, held in Pittsburgh, on Thursday, May 1, 1919, a resolution was passed by Council appropriating \$500 to the French-Belgian Relief Fund, which fund is to be used to assist dentists in France and Belgium who have suffered total losses during the war. Article I, Section 4 of the By-laws of our society reads in part as follows: "They [the Council] shall vote no money except for the legitimate expenses of the society." Therefore your president and recording secretary, who sign the orders for the payment of the bills of the society, concluded that it was beyond their authority to put this resolution into effect, and also considered it unwise to establish a precedent in this matter by granting this appropriation and then asking the society to ratify their action. This resolution should be brought before the society at a general session at an early period, and if the report of the treasurer warrants the granting of this or a smaller sum, I



recommend that it be sent to Dr. L. M. Waugh, treasurer of the Preparedness League of American Dentists at the earliest possible moment. The need is very great. This is indicated in a letter received by me from Dr. J. W. Beach, president of the Preparedness League of American Dentists.

#### THE JOHN R. CALLAHAN MEMORIAL.

In conjunction with the foregoing subject, it would be well to consider the appeal which is being made by a committee of dentists of this society for the John R. Callahan Memorial, for a contribution of a dollar a member from the members of the Pennsylvania State Dental Society. The high cost of everything has been recognized by the various committees engaged in arranging our program, and I think it will be impossible to donate such a sum from our treasury, but do believe that if the matter is taken up in each component society, a sum near to or exceeding the sum asked for by the committee can be raised. Men like Dr. John R. Callahan should never be forgotten, and the least we can do to preserve him in our memories is to contribute our dollars through our component societies. Perhaps the Council will make some recommendations on this subject at a future session of the society.

#### RESEARCH INSTITUTE OF THE NATIONAL DENTAL ASSOCIATION.

This society voted a special contribution of \$2000 to the National Research Institute a few years ago to be paid at the convenience of the society. The sum of \$750 was paid on this account previous to our last meeting, and on November 14, 1919, a check for \$500 was sent to Dr. King toward the liquidation of the account.

The National Dental Association is anxious to be clear of this debt. At one of the meetings of the House of Delegates, the sum of \$14,000 was subscribed on the floor for the liquidation of this debt on the Research Institute, which indicates the confidence placed in it by

many men from all sections of the country. I am sorry to report that only \$200 of the amount subscribed on the floor came from Pennsylvania men. With these facts in mind we should fulfil our obligations as speedily as the treasury will warrant.

#### THE MEMBERSHIP DRIVE.

An appeal for increased membership in the National Dental Association from the secretary of the National Dental Association, Dr. Otto U. King, led your president to inaugurate a membership drive in every component society from January 1 to March 1, 1920. The appeal was made by me through the *Bulletin* to all the component societies. The first step was to get all back dues paid up, and the second step was to ask each paid-up member to act as a "self-starter" in the campaign, asking each member to propose a worthy new member.

The results of this drive have varied in the different societies according to the seriousness with which the plan was followed. The paid-up membership on April 1, 1920, compared with the paid-up membership on the same date, 1919, shows a total increase of three hundred and sixteen members.

The Registration Committee has posted the percentages of increased membership at their booth at a conspicuous place, thus affording each one an opportunity to notice what his or her society has accomplished in this drive. While the results are not all that could be desired, I feel the efforts put forth have not been in vain, and that Dr. King will be pleased with the corresponding increase for the National Dental Association from Pennsylvania. I wish to take this opportunity to thank all those who have labored for this goal.

#### THE REVISION OF THE CONSTITUTION AND BY-LAWS.

By action of Council a committee of three, of which your president is chairman, was appointed to revise the Constitution and By-laws. A full report

of the deliberations of this committee will be read at the proper time. However, as president of your society I wish to urge upon you to make a careful study of the proposed constitution, in order that you may vote intelligently upon it when it comes up for adoption at our next annual meeting.

#### COMPONENT SOCIETIES.

The suggestions relative to the government of component societies, etc., will be taken up at length in the report of the Committee on Revision of the By-laws.

#### AN EXTENSION OF THE TIME OF MEETING.

The time of the annual meeting should be extended one more day to allow Council to give fuller discussion to its problems and to allow it to meet at more opportune times than the "mid-night hour," which has frequently been the case. The society needs more time for its deliberations.

Many members cannot attend the exhibits because of the lack of time during a three-day session. This is unfair to the members and the exhibitors. Nearly all other societies of the size and importance of our society have a four-day session. A program can be arranged to better advantage for a session of four days. This conclusion is based on actual experience and from scrutiny of programs of other societies. This matter should be brought before Council for their consideration.

#### STATE BOARD OF DENTAL EXAMINERS.

It seems to me that a more comprehensive report should be made by the State Board of Dental Examiners at our annual meetings, which would indicate in a condensed form the proceedings of the year, the number of applicants, new rules adopted, etc.

The secretary of the Board of Dental Examiners has informed me that a number of changes of more or less importance should be made in our dental law,

in order that the work of the board in its relation to the registration of the dentists of Pennsylvania would become clear and simple in the minds of the entire profession of Pennsylvania.

The changes indicated in the following paragraphs, as suggested by the secretary of the board, should receive the indorsement of the society and should be taken up by the Legislative Committee or by a special committee.

Section 2, paragraph 2, to read, "maintaining a four-year course in dentistry" instead of three years.

Section 2, paragraph 10, to read, "before a magistrate or justice of the peace" instead of "in the court of quarter sessions."

Any penalty that is as low as ten dollars should not be allowed to go to court, but settled in the magistrate's office.

Section 2, paragraph 13, add, "relative to the practice of dentistry unlawfully."

This would clear up the idea that the board gets the registration fee.

Section 5. Leave out proviso about the rights of a person to continue practice who has been in the actual lawful practice for five years continuously preceding this act.

Section 6. More clearly defining the unlawful practice of dentistry, putting proof upon the practitioner, not on the prosecutor; so that it will be easier to convict illegal practitioners.

Section 7. To prevent anyone practicing dentistry under any name other than the one given in the diploma.

#### DENTAL HYGIENIST.

At the last meeting of this society held at Pittsburgh, this society went on record "That it was the sense of the majority present that the licensing of the dental hygienist or dental nurse is detrimental to the interests of dentistry and dangerous to the public, and that the Pennsylvania State Dental Society once more put itself on record as being opposed to licensing the dental nurse or dental hygienist."

The stenographer at this meeting took



it for granted that my discussion of this subject was in written form and therefore had no record of my remarks, and last November I was asked to send my discussion to the DENTAL COSMOS in time for the December number. You may imagine my surprise at this discovery, and at that time resolved to put myself on record in this address as in favor of the dental hygienist.

The most important question for this society to decide at this meeting is not only, "Shall the dental hygienist become legalized in Pennsylvania?" but, "What qualifications shall the dental hygienists present to our State Board of Dental Examiners?" in order that they may serve the private practitioners or the public schools or the charitable institutions to the everlasting credit of the dental profession and command the respect of an appreciating and health-seeking public.

It seems almost unnecessary to speak to such an intelligent audience on the subject of "Oral Prophylaxis and Its Relationship to Good Health," but in order that we may arrive at some concrete constructive conclusion, I wish to bring to your attention the following fourteen undeniable truths which have a direct bearing upon this subject:

(1) A clean tooth seldom decays.

(2) The demand for dental services exceeds the supply of dentists: (a) The four-year course now in force and the additional predental year which will be required by the schools under the supervision of the Dental Faculties Association of American Universities in 1921, will not increase the number of dental graduates.

(3) The responsibility for the lives of patients with areas of focal infection in their mouths rests between us and the patients and not upon the physicians.

(4) Focal infections can be almost entirely prevented by early and regular attention to the teeth.

(5) Pyorrhea can be prevented by regular prophylaxis.

(6) The average dentist abhors prophylactic work.

(7) The health of a nation cannot

be any better than the condition of the mouths of its inhabitants.

(8) The best results of preventive dentistry are obtained in the school room, beginning at the age of six years.

(9) The Superintendent of Public Instruction of the State of Pennsylvania is in favor of the dental hygienist with a good preliminary education.

(10) The Commissioner of Health of the State of Pennsylvania claims the dental hygienist may perform prophylactic operations on the mouths of school children in Pennsylvania without any credentials from the State authorities.

(11) The Commissioner of Health *prefers* that the Pennsylvania State Dental Society frame its own act relative to legalizing the dental hygienist, and will not interfere in the passage of the law.

(12) The dignity of the dental profession would be lowered in a legislative fight against the State Department of Health.

(13) The legalization of the dental hygienist will not change the practices of the advertising dentists.

(14) The dental hygienist will be as essential to the dentist and the community as the medical nurse is to the doctor and the community.

My conclusion based on the above statements and on a careful, unbiased, unselfish consideration of the entire subject in all of its phases, is that the Pennsylvania State Dental Society should not adjourn until some constructive action has been taken to care for this most vital problem.

It is my hope that the Oral Hygiene and Public Dental Education Committee or the Legislative Committee will be able to suggest a solution to this problem in their respective reports.

#### PROGRAM.

The program offered to you at this meeting must speak for itself. It represents the untiring efforts of the committees from June 10, 1919, to the present, and their duties will not end until this meeting has adjourned and most of



the members have returned to their homes. I wish to take this opportunity to thank each one of them and also the many members of the Reading Dental Society who will assist in making this meeting a success, but whose names do not appear on the program.

PRESIDENT-ELECT OF THE NATIONAL  
DENTAL ASSOCIATION.

This address would not be complete without referring to the honor which has come to this society through the unanimous election of Dr. H. E. Friesell, of Pittsburgh, to the office of president-elect in the National Dental Association. We wish him success, honor and glory as the head of the greatest dental organization in the world. The membership drive was made in his honor, and no one worked harder than Dr. Friesell for Pennsylvania's share of the 6000 new members asked for by the National Dental Association for the Boston Meeting.

NATIONAL DENTAL ASSOCIATION  
MEETING.

Mechanics Building, Boston, Mass.  
August 23 to 27, 1920.

The great Mechanics Building will afford accommodations for all the meetings, clinics and exhibitors under one roof. Ten thousand persons are expected. We owe it to ourselves to be present.

FRATERNITIES.

So much has been said about dental fraternities during the past year in one of the dental magazines that I thought it would be well to express my views on this subject before concluding my address. Any dental fraternity that is conducted on the principles on which it was founded will wield an influence for good on the whole dental profession. But if any fraternity seeks by sheer force of numbers to become a ruling power in the dental profession, it will ultimately become a destructive force. The one big

union idea has been exploded. I hope these few remarks will stimulate sober thoughts about fraternities. The remarks of those opposed to fraternities in general are usually so prejudiced that they cannot be taken seriously.

Dr. SWING. Gentlemen, your President's Address has been read and is now before you. What is your pleasure?

Dr. SEIP moved that a committee of three be appointed by the chairman to take up this most excellent address of the President and report its deliberations and recommendations at a subsequent session. (Motion carried.)

The chairman appointed the following as a Committee on President's Address: L. Pierce Anthony, G. H. Smock, and W. D. Mausteller.

Dr. Schlegel then resumed the chair.

THE PRESIDENT. Next in order is the reading of the minutes of the last meeting.

Dr. FICKES moved that because of the fact that the records of the proceedings had been published in the regular annual report and distributed among the members, the reading of the minutes be dispensed with. (Motion carried.)

THE PRESIDENT. The next business in order will be the report of the secretary, Dr. W. L. Fickes.

Dr. Fickes, secretary, presented his annual report, which on motion was accepted.

The Treasurer, Dr. A. B. Miller, next presented his annual report.

It was moved and carried that the report of the Treasurer be accepted as read, and that a committee be appointed to audit the report.

President Schlegel appointed the following as an Auditing Committee: Drs. McParland, Eisenhart, and Naylor.

The convention adjourned until 8 P.M.

(To be continued.)

# THE DENTAL COSMOS

A MONTHLY RECORD OF DENTAL SCIENCE.

*Devoted to the Interests of the Profession.*

EDWARD C. KIRK, D.D.S., Sc.D., LL.D., *Editor.*

L. PIERCE ANTHONY, D.D.S., *Associate Editor.*

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PHILADELPHIA, JULY 1920.

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## EDITORIAL DEPARTMENT

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### “Eventually! Why Not Now?”

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FOR a full half century the dental profession of the United States has included among its varied activities the creation and development of a dental corps in connection with the Army and the Navy establishments. The history of the effort toward this objective is a story of varying successes and disappointments, of apathy and enthusiasm, of opposition on personal and on political or professional grounds and ultimate success materialized by the exigencies of the world war.

Beginning its service without recognized military status upon a contract basis the Dental Corps of the Army was accorded a definite commissioned status on a dignified basis when the United States entered the war. As the result of this recognition of the indispensable character of dental service as a health conserving factor in the military establishment, the organization of the Dental Surgeons Corps of the United States Army exceeded in complete-

ness, adequacy, equipment, and efficiency of organization that of any other belligerent nation. The record of its achievement is not yet complete nor will it be for years to come, but in its broader outlines it is the just object not only of professional but National pride.

As an achievement the organization of the Dental Surgeons Corps may be viewed from two angles. First, as the result of long years of effort upon the part of the dental profession to practically demonstrate that dental service is an important factor in the conservation of bodily health and that physical and mental efficiency are in large degree dependent upon a sanitary condition of the human mouth. Second, the wisdom of our national legislators in providing the enabling enactments to make possible the demonstration in practice of these principles in so far as they are related to the welfare of those in the defensive service of the nation. The test has been made and the results attained have proved the soundness of the premises upon which the test was projected. We direct renewed attention to this matter at this time now that the war is over in the sense that active hostilities have ceased and with their cessation has come an attitude of mind more or less general that "the job is done," that the necessity for the unusual and abnormal output of energy, of resourcefulness, of active effort to secure for the Army and Navy the best that dentistry has to offer of service has passed and that nothing further is needed to be done.

This tendency to a mental slump is a fatal mistake. To let matters rest at this stage of achievement is to lose much that has been gained. Now is the time to profit by the practical experience that the war emergency has developed and upon that experience to build wisely and soundly for the future.

The Army is being reorganized, demobilization is complete, several million men are returned to civil life whose experiences have broadened their outlook and given them a clearer and more just estimate of several important life values. The majority have had deeply impressed upon their minds the fundamental importance of sound bodily health as the basis of life success and individual happiness. Most of these men know in general, at least, the part which oral hygiene plays in the bodily health problem. Should another occasion arise for the return of these men to military



duty, the demand for an adequate Army dental service would be universal. The time to prepare for such a contingency is now while the dental experiences of the world war are fresh in mind, when any deficiencies of the service can be corrected and improvements be intelligently made.

The initiative in this respect must come from the dental profession, not from the National government. The Army Dental Surgeons Corps is the child of the dental profession and it is to the dental profession that the Dental Surgeons Corps looks for direction and help in its growth and development toward a larger sphere of usefulness to the Army and Navy and indirectly to the whole nation.

As the process of reorganization is now in progress we feel that the affairs of the Dental Surgeons Corps should receive immediate and helpful consideration at once by the constituted dental authorities. The question of the adequacy of the Corps with respect to the personnel of the regular Army, the grades and status of its officers, the extent and character of the service to be rendered, and more particularly the organization of the Dental Reserve Corps upon a peace basis.

We feel that there has not been shown the practical interest upon the part of the dental profession in the Reserve Corps to which by its importance it is entitled. The Reserve Corps, by reason of its theoretical field of usefulness, should attract to its membership the more experienced and better trained minds of the dental profession as has occurred in the case of the medical profession and its Reserve Corps. There should be a strong body of the best men in the dental profession constituting the Dental Reserve Corps acting in an advisory capacity as occasion requires and the rewards as to rank and emoluments of Reserve Corps membership should be adequate to attract and hold men of that character.

These are some of the considerations which we think should be taken up for investigation at the coming National Dental Meeting, and plans formulated for carrying into effect such desirable improvements in the Army and Navy Dental Service as the rich harvest of experience, derived from the world war activities, clearly indicates should be materialized in definite features of reorganization and regulation.

## PRACTICAL HINTS

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This Department specially welcomes the brief presentation by our readers of any novel suggestions or methods which in their own practice have proved to be time-saving or to possess other features of advantage.

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### Radiographic Evidence in Favor of the Extraction of Unerupted Impacted Teeth.

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By **M. HILLEL FELDMAN, D.D.S., New York City.**  
CONSULTANT, DENTAL DEPARTMENT, LINCOLN HOSPITAL.

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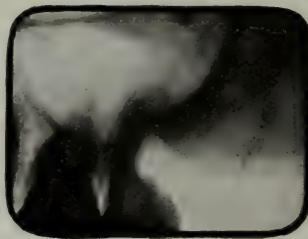
THE writer wishes to present his radiographic evidence of a case recently referred to him in the practice of Oral Surgery, which speaks volumes for the affirmative in the debated question as to whether or not unerupted impacted teeth should be extracted.

was taken after the removal of the third molar in order to determine whether it would be necessary to extract the second molar, as the overlapping effect of the third on the second molar in the first film might possibly have been a photographic illusion. When examination showed that

Fig. 1.



Fig. 2.



The first radiograph (Fig. 1) shows the third molar pressing against the second molar sub-gingivally. Just how strong the pressure brought to bear is, can be seen from the second radiograph (Fig. 2), taken after the removal of the third molar. The distal aspect of the second molar shows a considerable degree of resorption. The second radiograph

the second molar was really so badly indented by the third molar, the writer forthwith extracted the second molar as well.

In commenting upon the degree of resorption of the second molar, the writer wishes to call attention to the fact that an unerupted tooth never rests but is continually in motion, even when ar-

rested apparently by a tooth opposed to its normal eruption. It is the pressure exerted by the third molar, as in this instance, or by a cuspid, as in so many instances, which no matter how long standing or how slow the progress causes reflexes upon the spinal nerves to the

gradual undermining of the individual's health.

The writer wishes again to affirm his belief that unerupted impacted teeth should be removed when discovered.

616 MADISON AVENUE.

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## To Remold Temporary Stopping.

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By DAVID BARNES, D.D.S., L.D.S., Regina, Canada.

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SAVE all scraps of temporary stopping; separate white from pink. Cut nozzle screw off of an old discarded metal water syringe and enlarge hole to about diameter of ordinary stick of temporary stopping. Take off top of syringe; remove the spring; knead up scraps of gutta-percha in warm water and pack

into syringe; screw on lid and place the syringe into pan of hot water. When good and warm lift out with towel or old pair of gloves; press down plunger and the temporary stopping will come out in long smooth stick which can be cut in suitable lengths when hardened.

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## Prophylaxis More Often a Necessity.

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By S. RONKIN, D.D.S., Brooklyn, N. Y.

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THE practitioner of today invariably instructs patients on the importance of sound teeth and healthy gums. He prescribes toothpowders, mouthwashes, etc., and after taking care of the mouth, he dismisses his patient with instructions to return again in six months, so that the teeth may be examined again and a prophylaxis performed.

A moment's thought on the all-important subject of oral hygiene must bring one to the conclusion that the cleansing of the teeth by the dentist should be performed more frequently. Especially is this essential in smokers and in people who have passed the age

of forty years. At this stage the individual is more or less susceptible to pyorrhea alveolaris. Necrosed teeth, gingivitis, etc., are present in a great many people. A systemic infection may follow, or the general health may be lowered, by the continual production of pus.

There is no question of the importance of the subject, and we should insist upon scrupulous cleanliness of the mouth and teeth, particularly clearing away the tartar and the pockets of pus. An adult should have his teeth cleansed in this way by a dentist once a month.

5304 FIFTH AVE.



## REVIEW OF CURRENT DENTAL LITERATURE

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[*The Dental Record*, London, January 1920.]

### On Lingual Arches for the Correction of Malocclusion of the Teeth. BY SHELDON FRIEL.

The main differences between the appliance used by Friel and that by Mershon (*DENTAL COSMOS*, March 1919, p. 247) are in the application of the force to move the teeth and in the amount of freedom to the anchor teeth. In Friel's appliance the force obtained to increase the size of the wire arch is by means of a nut and screw on the arch working against a horizontal tube on the molar bands, instead of by the opening of loops in the wire arch which is anchored to the molar teeth by means of half-round vertical tubes and a modified Young-Angle lock.

The amount of force can be much more accurately gauged by a nut and screw than by the opening of loops, the attachment to the molars is more self-cleansing than the Young-Angle lock, and the anchor teeth are less rigidly held in a horizontal round tube, which allows them to have individual movement during mastication than in a vertical half-round tube, where the stress of mastication on one side must be transmitted to the anchor tooth on the other side.

In certain cases it is desirable to have some form of anterior attachment to prevent the arch being displaced from its tubes. The band for such a purpose may be constructed as follows:

A strip of iridio-platinum band material about one and three-quarters of an inch long is taken and one end is soldered to within one-eighth of an inch of the other end, thus leaving a free end of one-eighth of an inch inside the circle. The ring is now placed on the tooth and the band squeezed as if for a pull-to joint, care being taken that the blade of the pliers next the soldered end is kept steady and the other blade brought toward

it. The free overlap is now soldered to the part lying over it and the original soldering. The surplus is then cut off, leaving a band made with an overlap joint. Any attachment can be soldered on top of the joint of a band made by this method. The attachment soldered to these bands to prevent displacement of the arch should give sufficient play to allow the banded tooth free movement in mastication.

Friel has found that the constant heating of Angle's soldering tweezers holding the joints of the iridio-platinum band-strips together soon burnt the ends away. Pieces of the standard of an upright incandescent gas mantle were substituted for the metal ends. They take up little heat and do not burn away.

The attachment for intermaxillary elastics from the plain bands on molars to buccal arch on opposite jaw should be soldered at or near the mesio-buccal angle so as not to tilt the molars. The hook should be bent at an angle, preventing displacement of the elastic during mastication.

Friel has used with much gratification a combination of the lingual and buccal arches in the upper jaw in the treatment of Class II, Div. 2, or for the buccal expansion of the upper jaw in Class II, Div. 1.

[*American Journal of Medical Sciences*,  
March 1920.]

### The Physical Signs of Foreign Bodies in the Bronchi. BY THOMAS McCRAE.

In one case (No. 683) the foreign body was a short canal reamer; in another (No. 675), a gold bridge.

One of the signs of foreign body in bronchus which has received the most attention is the "asthmatoïd wheeze." This sound can be heard by placing the ear or the bell of a stethoscope close to the patient's mouth. It may be heard with both inspiration or ex-

piration, but sometimes is only audible at the end of forced expiration. forcible respiratory effort usually increases the loudness and intensity. It differs from the wheezing sounds heard with bronchial asthma, but this difference is difficult to describe in words. The "wheeze" varies in pitch and loudness, depending on the character of the foreign body causing it. In no case could the sound be heard over the chest wall. This sign appears to be of special value, particularly in cases in which the foreign body does not show in the roentgenograph.

In addition to this "asthmatoïd wheeze," McCrae calls attention particularly to two other signs of value: the decreased expansion on the affected side, and the presence of very fine "tissue paper" râles over a small area. This latter sign has been observed only with a small metallic body. Metallic objects also at times may cause permanent changes, usually in a lower lobe.

The chief errors in diagnosis are to mistake the signs for those of pneumonia (McCrae has not seen pneumonia associated with any case of foreign body in a bronchus) in the early stages and in the acute cases, and for tuberculosis after the body has been present for some time.

[*La Revue de Stomatologie*, 1920, No. 2.]

#### **The Dental Portal of Tubercular Infection.** BY JOSEPH MENDEL.

The work was done at the Pasteur Institute. It is an experimental study, presumably the first of its kind. Virulent bovine tubercular bacilli were introduced into the dental pulp of the ape. This was rapidly followed by a very severe form of generalized tuberculosis. The pathway of infection was apparently through the blood stream and not by way of the lymphatics.

[*Correspondenzblatt fuer Zahnärzte*, Berlin, Jg. 1920, H. 1.]

#### **The Disappearance of Roots into the Maxillary Sinus.** BY WILLIGER.

At times in attempted extractions of maxillary premolars or molars, the root unavoidably slips out of the forceps and disappears. It may have been forced into a cyst cavity or into the maxillary sinus. The differential diagnosis may be made by having the patient

hold his nose and blow. If air is forced through the socket, the root is in the antrum. The absence of air, however, does not mean necessarily that the root is in a cyst cavity, for the swollen mucosa of the antrum can prevent the passage of air. Syringing with water may then be resorted to (without much pressure). In case of a cyst the water will run back into the mouth; in case of the antrum some of the water will find its way through the nostrils.

When such an accident as this happens measures must be taken at once to remove the root. If the tooth be in a cyst-cavity, then merely widening the socket will permit the removal of the root. If it be in the antrum, Williger gains access to it secondarily through the canine fossa. It may happen that the root is lodged between the mucous lining of the sinus and its bony wall. The position of the tooth can generally be recognized or felt. The mucosa is then slit and the root removed with pincers.

Williger illustrates the details by reference to one concrete case.

[*Journal of American Medical Association*, March 6, 1920, Vol. 74, pp. 656-663.]

#### **Squamous-cell Epithelioma of the Lip.** BY A. C. BRODERS.

The conclusions of this very complete and statistical study of 537 cases follow:

1. These 537 cases represent 26.85 per cent. of 2000 cases of general epithelioma.

2. Labial squamous-cell epithelioma occurs more often in males than in females; the proportion is 49:1. It occurs in patients past middle life; their average age is 57.3 years.

3. The disease occurs most often in farmers; they represent 56.7 per cent. of the cases. The percentage of agricultural workers in the 2000 cases or in the whole hospital is unfortunately not given.

4. Family history of malignancy plays a negligible part.

5. The site of the cancer was preceded by a sore or ulcer in 63.3 per cent. of the cases.

6. About one-fifth of all the patients do not use tobacco, while one-half of the female patients do not use it.

7. Of the patients using tobacco, 93.33 per cent. smoke; 78.48 per cent. of these use a pipe.



8. A comparison of 500 men without epithelioma of the lip with these 537 patients with epithelioma of the lip shows that the percentage of tobacco users and non-tobacco users is practically the same; 78.6 per cent. users and 21.4 per cent. non-users in the former (normal) group. *Of.* with Conclusion 7.

9. The most remarkable difference in a comparison of the patients with labial epithelioma and the men without labial epithelioma is the method of smoking. The total number of pipe smokers in the former is 78.48 per cent. and the total number of cigarette smokers is only 1.16 per cent., while in the latter (normal) the total number of pipe smokers has dropped to 38.03 per cent. and the total number of cigarette smokers has risen to 59.04 per cent.

10. A history of injury plays a negligible part.

11. The duration of the lesion shows a marked variation, from 0.08 yrs. to 28 yrs., with an average of 2.58 yrs.

12. The greatest diameter of any lesion is 12.5 cm.; the average, 2.4 cm.

13. The lesion originated on the lower lip in 95.69 per cent. of the cases, on the upper lip in 3.55 per cent., at the left angle of the mouth in 0.56 per cent., and at the right angle of the mouth in 0.18 per cent. (The difference of the two latter figures, if they are of any significance, may be associated with the more common way of holding the pipe.)

14. In 29.05 per cent. of cases the patients were treated with acid, paste or plaster, etc., before they entered the clinic.

15. In 17.87 per cent. of cases the patients were operated on before they entered the clinic.

16. In 96.08 per cent. of cases the patients were operated on at the clinic.

17. In 87.01 per cent. the regional lymph nodes were removed.

18. Of the 449 cases in which the lymph nodes or salivary glands were removed, metastasis was demonstrated in 23.38 per cent.; the submaxillary lymph nodes were involved in 87.61 per cent.; the submaxillary salivary glands in 21.90 per cent.; the submental lymph nodes in 24.76 per cent.; and the cervical lymph nodes in 24.76 per cent.

19. In a division of the epitheliomata ac-

cording to cellular activity (differentiation), on a basis of 1 to 4, Grade 1 (marked tendency to differentiate) represents 15.82 per cent.; Grade 2 (processes of differentiation and non-differentiation about equal), 62.01 per cent.; Grade 3 (undifferentiated epithelium forms about three-fourths of the growth), 21.04 per cent.; and Grade 4 (no tendency to differentiate), 1.11 per cent.

20. The average duration of the lesion according to grade is longest in Grade 3, 3.33 yrs., and shortest in Grade 4, 1.29 yrs.

21. The average size of the lesion according to grade is largest in Grade 3, and smallest in Grade 1.

22. Of the patients operated on and traced, 40.52 per cent. are dead and 59.47 per cent. are alive.

23. Of the living patients, 92.85 per cent. report a good result, having been free from the disease on an average of 7.76 yrs.

24. Of the patients operated on who have died, concerning whom information has been received, 63.63 per cent. died from epithelioma.

25. Eight (or 1.55 per cent.) of the patients who were operated on died in the clinic, while the actual operative mortality was only 0.77 per cent.

26. The users of tobacco who were operated on did not obtain as good results as the non-users of tobacco; 78.14 per cent. in the former, and 86 per cent. in the latter.

27. In the inoperable cases, the non-users of tobacco reached as high as 30.76 per cent.

28. The patients who were treated with pastes, plasters, etc., before entering the clinic, did not get such a high total of good results as those who were not so treated; 62.06 per cent. in the former and 77.08 per cent. in the latter; moreover, 31.91 per cent. of the former who were operated on had metastasis, while only 19.48 per cent. of the latter operated on had metastasis.

29. Of the patients with metastasis, 17.39 per cent. are living and 82.6 per cent. are dead.

30. Of the living who had metastasis, 83.33 per cent. report a good result. In these patients the submaxillary lymph nodes on only one side were involved.

31. No patient with the cervical nodes or more than one group of any lymph nodes involved has been reported living.

32. Of the patients reported dead who had



metastasis, 91.66 per cent. died from epithelioma.

33. If a patient has the submaxillary lymph nodes on one side only involved, he has a 1 to 3 chance of getting a good result, and will be living and well on an average of 6.18 yrs. after operation.

34. Of the patients operated on in whom no metastasis was demonstrated, 76.26 per cent. are living and 23.73 per cent. are dead; of the living 92.71 per cent. report a good result.

35. The average duration of the lesion in the patients with metastasis is 3.27 yrs., as compared with 2.40 yrs. in those without metastasis; the average size of the lesion is 3.74 cm. in the patients with metastasis, as compared with 2.01 cm. in those without metastasis.

36. Among the known causes of death, deaths from epithelioma were as follows: none of Grade 1; 54.90 per cent. of Grade 2; 84.21 per cent. of Grade 3; and 100 per cent. of Grade 4.

37. Some malignant neoplasm was associated with the epithelioma of the lip in 0.93 per cent. of the patients.

[*La Revue de Stomatologie*, Paris, No. 2.]

#### **Pathological Anatomy and Pathogenesis of Dentigerous Cysts.** BY J. TELLIER AND CH. DUNET.

The authors describe a case in very great detail. The interest of this report lies particularly in the fact that they believe it easier to interpret their findings in terms of the older theory of Broca ("Traite des follicular tumeurs"; t. ii., 1863) than in accord with the more generally held theory of Malassez.

[*Archives of Dermatology and Syphilology*, April 1920, Vol. 38, n. s. Vol. I, No. 4, pp. 396-412.]

#### **Congenital Ectodermal Defect—Report of Case.** BY W. H. GOECKERMANN.

The first case of this type known to Goeckermann is that of Guilford (DENTAL COSMOS, 1883, Vol. xxv, p. 113). The author is acquainted from the literature with five other cases than his own. The other patients were men; his a woman of twenty-one years. The vermilion border of the lips was poorly defined. Both jaws were devoid of visible teeth,

although the roentgen-ray revealed several "fragments" of teeth in the right maxilla. The patient remembered having had several defective maxillary teeth, but never any mandibular teeth. Goeckermann describes the other ectodermal defects and gives a résumé of the general examination. No pertinent familial history was elicited.

Among Goeckermann's conclusions are: Although the patients of this group all present a *facies* very closely resembling that of congenital syphilis, the influence of syphilis in the production of these defects is probably *nil*. The ectodermal defects are total absence of sweat glands, almost total absence of sebaceous glands, hypotrichosis with absence of lanugo hair and a dental aplasia. Such patients suffer from a disturbance of the thermoregulatory mechanism (inability to eliminate necessary amount of water).

[1918, *Nordiskt Medicinskt Arkiv*. Stockholm, October 18. 51 Int. Med. Sect. No. 1, pp. 1-12, per *J. A. M. A.*, Sept. 13, 1919, Vol. 73; 873.]

J. STRANDBERG describes in detail a case (man, aged thirty-nine) of various malformations from arrested development including entire absence of teeth and atrophy of the skin, scanty pigment, no sweat glands or hair.

Strandberg calls attention to the parallelism between this condition, anomalous in man, and the normal condition in the cetacea. He has found five analogous cases on record.

[*Journal of Tropical Medicine and Hygiene*, London, January 15, 1920.]

#### **The Etiology of Thrush.** BY ALDO CASTELLANI.

Castellani is convinced that the etiology of thrush is far from being so simple (solely due to *Oidium albicans*), but that it is caused by a number of different fungi, and that the term "thrush" covers a group of clinically similar conditions due to different fungi. The fungi so far found are: Several species of *Monilia*, Persoon; three of *Oidium*, Link, and one each of *Hemispora*, Vuillemin; *Endomyces*, Rees; *Saccharomyces*, Meyen; *Willia*, Hansen.

In the author's experience, two principal clinical varieties of thrush may be distinguished:

(1) The white, or whitish-gray type; by

far the more common; the patches are cream-colored; caused by any species of *M.* (except *M. zeylanica* and *M. zeylanoides*), *O. matalense*, *E. vuillemini*, and species of the genera *Saccharomyces* and *Willia*.

(2) The yellow, or yellowish-brownish type; patches are yellowish or occasionally brownish; caused by *M. zeylanica*, *M. zeylanoides*, *O. rotundatum*, and *H. rugosa*.

[*Bulletin National Anesthesia Research Society*, March 1920.]

**A Note on the Value of Nitrous Oxid-Oxygen Anesthesia in War Surgery.**

Reporting to the Southern Medical Association on his experiences with anesthesia in war surgery, Dr. Addison G. Prenizer of Charlotte, N. C., formerly Chief of Surgical Service, Base Hospital No. 6, A. E. F., says that nitrous oxid-oxygen was used only between September 10 and November 14, 1918, not that the surgical staff did not prefer it, but because the Unit was late in receiving its apparatus and was not able to secure more gas when the first supply was exhausted.

Publishing his observations (*Southern Medical Journal*, October 1919), Prenizer explains that:

"During the 65 days period anesthetics were given as follows:

Ether .....	473
Nitrous oxid-oxygen .....	341
Local .....	87
Chloroform .....	7

908

"We have used ether overwhelmingly over other anesthetics, quite a number of infiltration anesthetics with novocain and cocain and but little chloroform. We have rarely used ethyl chlorid as a general anesthetic, but have used it locally for small incisions. There was but one death we could attribute to an anesthetic and that was a death from chloroform in unskilled hands.

"The tranquillity of the patient, the rapidity and ease of induction, the rapidity of recovery, and the safety withal gives nitrous oxid-oxygen quite an advantage over the other anesthetics in the first and second stages of anesthesia, especially in cases where an absolute muscular relaxation is not needed. Even when ether is superimposed for deeper anes-

thesia, the amount is reduced to a minimum to maintain the period of relaxation.

"The types of cases where gas-oxygen is most valuable are:

- "1. Shock cases.
- "2. Cases where operation is to be of short duration.
- "3. Cases where the condition is profoundly bad and the post-operative period treacherous.
- "4. Chest cases, with the exception of those liable to show hemorrhage, and
- "5. Infection of the respiratory tract.

"Gas-oxygen is of great value in war surgery since the greater number of delayed primary and secondary suture of wounds can be made with the use of this anesthetic alone.

"The special advantages of gas-oxygen in war surgery are:

- "1. Ease and rapidity of inducing anesthesia, thus preventing a struggle, enabling the immediate beginning of the preparation of the field of operation and the carrying on of several parallel operations without the one disturbing or distressing the other.

"2. Rapid recovery and rapid exchange of patients between operating room and ward.

"3. The relief from the care of recovering patients on the wards and the consequent liberation of the personnel for other duties.

"All these points are important when the large number of secondary wound closures are considered—as many as sixty in a single day.

"The comfort of the patient is a decided point. There was no death nor injury from this anesthetic."

[*Revue Medicale de la Suisse Romande*, December 1919.]

**Vincent's Angina Simulating Hard Chance of the Tonsil.** BY GEORGES CORNAZ.

This case is interesting from two points of view: (1) the possibility of a marked clinical similarity of a Vincent's lesion to hard chancre, the only fact in the history which weakened this diagnosis being that the first ulceration appeared on the internal surface of the cheek.

(2) Novarsenobenzol is capable of rapidly curing a Vincent's infection. An injection (0.45) was made intravenously; on the next day, marked local improvement. There were then made two local applications and a second injection (0.60).



# PERISCOPE

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**Removal of Facings.**—It sometimes becomes necessary to again solder on the work after the facings have been cemented to place. This may be done after the facings have been removed. Place the bridge overnight in concentrated ammonia water. It will combine with the phosphoric acid and the cement will disintegrate.—F. W. FRAHM, *Pacific Dental Gazette*.

**Treatment of Pseudo-Ankylosis.**—When a case presents itself for extraction and examination shows a condition of temporary ankylosis or edema caused from an infected unerupted third molar, access can be gained by playing a stream of physiologic salt solution as hot as the patient can stand upon the inflamed area in the mouth for five or ten minutes. This is also very practical in cases of temporary ankylosis following the extraction of an impacted lower third molar.—DR. LEO C. HAUGHAWOUT, *Pacific Dental Gazette*.

**Plaster of Paris as an Impression Material.**—It has been said that we have a molder's job when we attempt to get an impression which will produce a cast that is a perfect reproduction of the jaw to be covered by the denture. In my estimation plaster of Paris properly mixed is the most yielding material that we have. It has no rival when we want a perfect mold.

It is almost impossible to get a perfect impression with modeling compound, because the compound will not flow to place, but must be pressed to place and thus will displace soft tissue, therefore it should be used for the tray. If this tray is properly trimmed we can get a perfect impression by using a creamy plaster, properly mixed, because thin plaster will conform to tissue without being forced to place as you are required to do in handling the modeling compound. By the use of plaster we do not need the so-called closed mouth impressions.—GEORGE P. BRENNER, *Journ. of the N. D. A.*

**Etiology of Periodontoclasia.**—Briefly summarizing the etiological factors of periodontoclasia, it may be said that they are arbitrarily divisible into two groups—primary or exciting and secondary or predisposing; that the one characteristic common to all the primary factors is that they are

irritative in their nature, and depend in large measure upon this quality for the initiation of periodontal diseases; that this irritative feature may express itself at the gingival margin only, where it brings about a solution of continuity in the floor of the subgingival space, or throughout each, manifesting itself in a pathology wholly characteristic, yet entirely unlike the other; that the secondary or predisposing factors, as their classification indicates, are dependent for the exercise of their influence upon local exciting causes; that the one outstanding fact in the prevention of periodontal lesions is the maintenance of the gingiva in health; and that the chief instrument to that end is mouth hygiene, than which nothing is of more importance in the whole realm of dental practice.—ARTHUR H. MERRITT, *Journ. of the N. D. A.*

**The Gold Shell Crown.**—Under the title "Cementing on a Bridge," by Dr. Frank W. Bage, in the *Dental Summary*, December 1919, the author incidentally mentions and credits Dr. Richmond as the inventor of the gold shell crown.

Like many others of the profession, I perhaps might have overlooked this little and no doubt innocent misstatement, were it not for the fact that this has since been quoted in the *DENTAL COSMOS* for February 1920, and the misstatement deserves correction.

Dr. Richmond was not the inventor of the gold shell crown.

The gold shell crown was patented by Dr. Beers in 1873, although Dr. W. H. Morrison claimed to have performed the same operation as early as 1869, a published description of it having appeared in the *Missouri Dental Journal* in May of that year.

It might not be out of place to mention that the shell crown under discussion is not of a recent origin.

Mouton of Paris, in 1746, mentions that gold crowns for anterior teeth are in bad taste and should be enameled (Guerini).

Give credit where credit is due.

Dr. Wm. Jarvie of Brooklyn, in his "Reminiscences and Experiences" in the *Journal of the Allied Dental Societies*, March 1914, has a similar misstatement.—MORRIS MESTEL, New York City, *Dental Summary*.



**A Short Cut in Plate Polishing.**—Our method consists in using the bristle polishing brush on the wax trial plate in much the same way that it is used upon the vulcanite plate. We all know how uneven the surface of a vulcanite plate comes out of the vulcanizer, even when we have carefully smoothed the wax with scraper and blowpipe. Unevenness, which we could not detect on the wax, shows on the rubber as soon as we begin to cut it down.

Uneven surfaces refuse to yield to a reasonable amount of pumice attrition, and have to be gone over with scraper and sandpaper. The sandpaper reduces these bumps, but leaves behind it scratches which only with difficulty can be erased with pumice. The interdental spaces are especially difficult to reduce, for the wax has a way of overfilling them, or else not filling them enough, and besides it is apt to climb up over the crowns of the teeth in a way which, when reproduced

in vulcanite, requires a chisel to reduce to proper bounds.

The remedy for all this is, as aforesaid, to use the revolving bristle brush on the wax trial plate, using it both on labial and lingual surfaces. This process smooths down the bumpy places, cuts down the climbing wax from around the crowns, rounds the interdental wax, and reduces to desired fulness. The next thing is to remove the scratches left on the wax by the bristles. This is easily done by going over the wax with a rag or pledget of cotton, wet with coal oil. This leaves a very smooth surface, to which it is almost superfluous to add by rubbing soapstone over the wax, but as this can very readily be done when soapstone is used for separation of flask, it is well to employ it. By this easy method we get a vulcanite plate which, after it comes from the vulcanizer, is readily finished with pumice and chalk—no scrapers, no sandpaper.—STEWART J. SPENCE, *Dental Digest*.

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## OBITUARY

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### Dr. William Miller Cooper.

[SEE FRONTISPIECE.]

DIED, April 29, 1920, of heart failure, at the home of his sister in Edgewood, Pittsburgh, Pa., WILLIAM MILLER COOPER, D.D.S.

Dr. Cooper was born in Uniontown, Pa., on December 15, 1871. He was the son of Daniel Frisbee Cooper and Phoebe (Miller) Cooper. Even when a boy at school Dr. Cooper was interested in dentistry, and spent many an hour in the laboratory of Dr. S. S. Macfarlane. After graduating from the high school Dr. Cooper attended the University of Pennsylvania, where he graduated with the degree of D.D.S. in 1892.

After his graduation he opened an office in Pittsburgh, Pa., where he practiced successfully for four years. He was then asked by Dr. Macfarlane, who had gone to Frankfurt a/Main, Germany, to take his practice for one year, as his health had broken down. A partnership was formed and Dr. Cooper came home to settle his affairs and be mar-

ried before returning to Europe to take up his profession there.

In 1912 Dr. Cooper's partnership with Dr. Macfarlane was dissolved and he opened an office of his own in Frankfurt, where he had a large and very successful practice.

Dr. Cooper was a man of great personal charm and strong character. Many of his patients were his closest friends, among them Professor Paul Ehrlich and Professor Niesser. Each season brought a number of prominent American and English patients, who came specially to have work done. Several of the nobility of Germany and Russia were patients of long standing.

Dr. Cooper was a member of the W. D. Miller Club of Berlin and of the American Dental Society of Europe, in which he several times held office. He was loved and respected by all his brother dentists in both countries and always stood for the highest in the profession he loved.

As soon as America entered the war he sent his wife and two children home to America,

intending to follow as soon as he could arrange his affairs. Some complications arose which detained him for a long time in Holland, so that he did not land until January. The long strain had undermined his health and he died of heart failure less than four months after his arrival in this country.

In 1897 Dr. Cooper was married to Helen Gilson of Pittsburgh, Pa., who, with one son, William Miller, and one daughter, Agnes Pollock, survives him.

His remains were interred in the family burial ground at Homewood Cemetery, Pittsburgh, on May 1, 1920.

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### Dr. David D. Smith.

DIED, at his home, Germantown, Pa., June 3, 1920, from chronic gastritis, DAVID DELOS SMITH, M.D., D.D.S.

Dr. Smith was born July 1, 1839, in Green County, N. Y., the son of D. M. and Grace (Lake) Smith, his parents removing to Penacook, N. H., in 1848, where Dr. Smith obtained his early education in the public schools and in the Boscawen Academy. In his early manhood he taught school in a sparsely settled region of the Catskills known as "Lake Indian" in Ulster County, N. Y.

In 1859 he became interested in the practice of dentistry and entered the office of a dentist in Cambridge, Mass., where he did laboratory work and began the study of dentistry. After an apprenticeship he began practice for himself in Penacook and is said to have made the first set of teeth on a vulcanite base worn in New Hampshire. He later entered the Philadelphia Dental College, from which institution he received the D.D.S. degree in 1867. In the same year of his graduation, he was elected a member of the faculty and made Professor of Mechanical Dentistry. He later in 1880 became Dean of the Philadelphia Dental College, but served only

a short time. While teaching in the Philadelphia Dental College he attended Jefferson Medical College, from which institution he received the M.D. degree in 1878.

Dr. Smith was prominently known throughout the dental profession for his strenuous advocacy of prophylaxis in the treatment of pyorrhea and for the general care of the oral cavity, and has contributed numerous articles on the subject of prophylaxis to dental literature.

Dr. Smith served in the Civil War with the Sixteenth Regiment of New Hampshire Volunteers and was mustered out with his regiment at Concord, N. H., at the termination of the war. He was a member of the American Dental Association; honorary member of the Massachusetts State Dental Society; the Northeastern Dental Association; the Odontological Society of Western Pennsylvania; and the Ontario Dental Society of Ontario, Canada.

Dr. Smith was married in 1861 to Miss Cynthia A. Shedd of Penacook, N. H. He is survived by one daughter, Alice Grace Taggart, wife of Dr. C. C. Taggart, a dentist of Pittsburgh, Pa., and two granddaughters.

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### Dr. Thomas D. Kellogg.

DIED, at his home in Charleroi, Pa., from pneumonia, after an illness of six months, May 13, 1920, THOMAS D. KELLOGG, D.D.S.

Dr. Kellogg was born in Charleroi, Pa., September 22, 1897, where he obtained his early education. In 1917, Dr. Kellogg entered the Dental Department of the University of Pittsburgh, from which institution he received the D.D.S. degree.

Dr. Kellogg was a young man of sterling qualities and his death brings sorrow to his many friends and acquaintances. He is survived by his parents and two sisters.

His remains were interred in the Charleroi Cemetery, Sunday, May 16, 1920.

# ARMY AND NAVY DENTAL NEWS

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## Assignments.

### Navy Dental Corps.

#### *Week ending May 8th.*

Lieut. Elmer A. Jasper, detached from naval training station, Newport, R. I.; to duty on Asiatic Station.

#### *Week ending May 15th.*

Lieut. Wm. T. Davidson, detached from Paris Island; to duty at navy yard, Philadelphia.

Lieut. Clarence M. Taft (class 2), detached from marine barracks, Quantico, Va.; to duty with marine expeditionary force on board the Henderson.

Lieut. Wm. J. Rogers, detached from receiving ship at New York, N. Y.; to naval training station, Newport, R. I.

Lieut. Ronnie A. Berry (class 2), detached from naval training station, Newport; to Rochester.

#### *Week ending May 22d.*

Lieut. Chester H. Webber, detached from navy yard, Mare Island, Calif.; to Prairie.

#### *Week ending May 29th.*

Lieut. George C. Fowler, detached from Prairie; to duty at naval hospital, San Diego, Calif.

### Army Dental Corps.

#### *Week ending May 15th.*

Capt. Joseph P. Collins to Letterman General Hospital, San Francisco, for duty.

1st-Lieut. Henry A. Winslow to Fort Slocum, N. Y., for duty.

1st-Lieut. Campbell H. Glascock to Jefferson Barracks, Mo., for duty.

1st-Lieut. Clarence W. Johnson report by telegram to commanding general Southern

Department for assignment to duty and station.

1st-Lieuts. Joseph H. Hickey, Harvey H. Crosby, Vernon E. Lane, Joseph S. Matson, Frank R. Keller, honorably discharged.

#### *Week ending May 22d.*

Lieut.-Col. Archibald L. Miller to Camp Meade, Md., for duty.

1st-Lieut. Oscar R. Reed to Fort Sam Houston, Tex., for assignment to duty.

#### *Week ending May 29th.*

Maj. Claudius G. Baker to Camp Jackson, S. C., for duty.

Capt. Harold M. Whitney, honorably discharged.

1st-Lieut. Elmer H. Nicklies to Los Angeles, Calif., and report by telegraph to commanding general Western Department for assignment to duty and station.

#### *Week ending June 5th.*

Maj. Arthur J. Hart having been found by an Army retiring board incapacitated for active service on account of physical disability incident thereto, his retirement from active service is announced; proceed home.

Maj. Harlan L. Thompson to Denver, Colo., general hospital 21, for duty.

Capt. Roy M. Kisner to Fort Sheridan, Ill., general hospital 28, for duty.

Capt. Leslie D. Baskin to Camp Dix, N. J., for duty.

Resignation by Capt. Curtis W. Hallam accepted.

1st-Lieut. William J. Cryderman to Southern Department for assignment to duty and station.

1st-Lieut. Milton J. Damlos to Camp Meade, Md., for duty.



# DENTAL COLLEGE COMMENCEMENTS

## University of Tennessee, College of Dentistry.

At the annual commencement exercises of the University of Tennessee, College of Dentistry, the degree of Doctor of Dental Surgery was conferred on the following graduates:

Maurice Ackerman ..... New York  
 Godfrey Bauer, Jr. .... New York  
 William E. Caffrey ..... New Jersey  
 James E. Donahue ..... Massachusetts  
 Charles A. Glancy ..... New York  
 Samuel Goldin ..... New York  
 Samuel Gottlieb ..... New York  
 Abraham J. Gritz ..... New York  
 Jacob Grumet ..... New York  
 David Kavalier ..... New York

Norman Lehmer ..... New York  
 Joseph L. McSweeney ..... New York  
 Nathan Nussbaum ..... New York  
 Isidore Rosenberg ..... New York  
 George C. Schwentner ..... New York  
 Nathan W. Stephens ..... New York  
 Jack A. Sussman ..... New York  
 Frank Teller ..... New York  
 Allen B. Townsend ..... New York  
 Cornelius N. Williams ..... Tennessee

## Royal College of Dental Surgeons of Ontario.

THE annual commencement exercises of the Royal College of Dental Surgeons of Ontario were held in Toronto, Can., on May 7, 1920.

An address was delivered by C. N. Johnson, M.A., D.D.S., of the Chicago College of Dental Surgery.

The degree of Licentiate of Dental Surgery was conferred on the following graduates:

C. H. Avery  
 F. E. Babcock  
 A. A. Backus  
 J. W. Bartholomew  
 F. W. Beach  
 L. R. Bell  
 W. M. Blakely  
 K. A. Blancher  
 W. M. Box  
 R. W. Bradley  
 B. Bregman  
 H. M. Brown  
 H. G. Brownlee  
 R. F. Butler  
 G. A. Buttery  
 H. J. Caulfield  
 A. M. Clark  
 V. A. Clark  
 C. C. Clermont  
 A. F. Cooper  
 J. G. Countryman  
 C. A. Courville  
 L. H. Croft  
 H. Davidson  
 H. R. Day  
 L. F. Dupuis  
 W. L. Durant  
 H. W. Eckel  
 W. Ewart

V. R. Farrell  
 R. F. Fralick  
 J. E. Fraser  
 G. L. Frawley  
 R. W. Freestone  
 H. R. Garbutt  
 G. E. Gemeroy  
 J. F. Giffen  
 C. S. Gilbert  
 J. W. Golding  
 F. G. Gollop  
 A. W. Grace  
 J. A. Graham  
 J. C. Green  
 A. C. Gunton  
 W. A. Hartley  
 R. E. Haryett  
 N. W. Haynes  
 M. J. Heney  
 J. H. Herrington  
 E. J. Hesson  
 E. D. Hicks  
 R. R. Hillis  
 I. L. Himelstein  
 R. J. Hiscox  
 W. T. Holmes  
 P. C. Hughes  
 J. T. Irwin  
 L. A. Johnson

G. Joynt  
 C. J. Kelley  
 E. T. Lajoie  
 J. V. Lally  
 J. S. Lapp  
 H. W. Leach  
 V. C. Long  
 B. Lundy  
 E. S. McBride  
 H. McCrostie  
 G. H. McKee  
 J. R. McLachlan  
 L. E. MacLachlan  
 R. C. McLaughlin  
 C. A. McLean  
 W. D. McLeod  
 P. H. McNichol  
 M. A. Mayer  
 S. A. Milburn  
 L. J. Miller  
 W. J. H. Miller  
 W. B. Mitchell  
 E. Miyake  
 S. Model  
 C. E. Morgan  
 G. S. Morgan  
 J. D. Morrison  
 W. R. Morrison  
 G. A. Morton

C. T. Moyle  
 N. J. Murphy  
 G. A. O'Connor  
 A. M. Palmer  
 G. G. Perdue  
 G. Pollock  
 W. A. Pommer  
 W. W. Race  
 E. A. Reid  
 W. R. Richardson  
 H. A. Ross  
 J. Rubenstein  
 E. A. Sadleir  
 W. M. Seymour  
 J. O. Shaunessy  
 V. D. Speer  
 W. W. Speers  
 W. A. Spence  
 J. H. Strath  
 H. D. Taylor  
 J. Teich  
 W. W. Yoaden  
 G. T. Walker  
 E. J. Walroth  
 A. H. Walton  
 F. A. Weese  
 A. H. Wilson  
 L. M. Wintroppe  
 P. H. B. Wood

### **Dalhousie University, Dental Department.**

At the annual commencement exercises of the Dental Department of Dalhousie University, held in Halifax, N. S., the degree of Doctor of Dental Surgery was conferred on the following graduates:

Basil R. Coysh

James A. Milne

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### **Loyola University, School of Dentistry.**

At the annual commencement exercises of the School of Dentistry of Loyola University, held in New Orleans, La., the degree of Doctor of Dental Surgery was conferred on the following graduates:

Walter B. Comeaux

Colin A. McHardy

Leo J. Schoeny

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### **Tulane University, School of Dentistry.**

At the annual commencement exercises of the School of Dentistry of Tulane University, held in New Orleans, La., the degree of Doctor of Dental Surgery was conferred on the following graduates:

C. M. Davison

J. L. Marmor

J. D. Norman

A. M. Echevarria

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### **Western Reserve University, Dental School.**

At the annual commencement exercises of the Dental School of Western Reserve University, held in Cleveland, Ohio, the degree of Doctor of Dental Surgery was conferred on the following graduates:

Arthur L. Goodman  
Edward C. Hird

Louis H. Madorsky  
Mitchell L. O'Kun

Frank D. Sladden  
Joseph D. Stewart

Samuel L. Spike  
Benjamin M. Toubkin

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### **University of Nebraska, College of Dentistry.**

At the annual commencement exercises of the College of Dentistry of the University of Nebraska, held in Lincoln, Nebr., the degree of Doctor of Dental Surgery was conferred on the following graduates:

Delphine G. Albrecht  
Gerald L. Butler  
Howard R. Cosford

Arlo M. Dunn  
Joseph A. Magnuson

John Palensky  
O. A. Ralston

Arthur H. Schmidt  
John R. Spencer

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### **North Pacific Dental College.**

THE annual commencement exercises of North Pacific College were held on June 1, 1920, in College Hall, Portland, Ore.

The degree of Doctor of Dental Medicine was conferred on the following graduates:

Harry H. Aldridge  
Herman Bouchet  
Oliver G. Chisholm

Eugene O. Hallan  
John W. Hamilton

Robert A. Hoag  
William H. Lowe

Lonner R. Pugh  
Todd E. Rudd

### St. Louis University, School of Dentistry.

THE annual commencement exercises of the School of Dentistry of St. Louis University were held in St. Louis, Mo., on June 7, 1920.

The degree of Doctor of Dental Surgery was conferred on the following graduates:

Masac Kashiwagi .....	Japan	Watal Tohyama .....	Japan
Hubert N. Magee .....	Missouri	August F. Walz .....	Missouri
Paul F. O'Brien .....	Missouri		

### Kansas City-Western Dental College.

At the annual commencement exercises of the Kansas City-Western Dental College, held in Kansas City, Mo., the degree of Doctor of Dental Surgery was conferred on the following graduates:

John W. Armour	Arnold D. Ewert	Owen M. Henderson, Jr.	Glenn E. Miller
Orville B. Bridenstine	Eugene R. Farrell	Louis C. Leabo	Grant T. Moen
John V. Brown	Glenn E. Faucett	Clarence W. Lowe	Forrest D. Ratcliffe
Chester J. Colter	Charles L. Gill	Richard J. Mansell	Wilbur M. White
Floyd J. Davis	Roy Graham	John P. Merritt	Ray Woodworth
Everett R. Duncan	Henry B. Granot		

### Atlanta-Southern Dental College.

At the annual commencement exercises of Atlanta-Southern Dental College, held in Atlanta, Ga., the degree of Doctor of Dental Surgery was conferred on the following graduates:

Howard T. Andrews .....	Georgia	L. Eugene Owen .....	North Carolina
George M. Harrison .....	Florida	John H. Sheffield .....	Texas
H. R. Howell .....	North Carolina	Buford H. Wade .....	North Carolina
Everett R. Kurfees .....	North Carolina	J. Lantye Williford .....	South Carolina
W. Tucker Merritt .....	Mississippi	Garnett A. Woodward .....	Georgia
M. Boyd Nall .....	Texas		

### College of Dental and Oral Surgery of New York.

At the commencement exercises of the College of Dental and Oral Surgery of New York, held in New York City, in January 1920, a special class was graduated.

The degree of Doctor of Dental Surgery was conferred on the following graduates:

Herbert Ackerman	Milton Hepner	Philip M. Ritter	Milton Schwartz
Anna R. Bruenn	Louis Klein	Joseph H. Rosenberg	Julius B. Seldin
Samuel H. Green	Roland J. Knobel	Milton Rosner	Louis H. Siegel
Jacob M. Greenbaum	Ludwig Moss	Freda R. Sale	Martha Storch
Aaron Heller	Maurice Nadel	Alexander S. Scherer	David L. Zahn

At the annual commencement exercises, held in May 1920, the degree of Doctor of Dental Surgery was conferred on the following graduates:

Otto Aratowsky	David B. Goldstein	Edward T. Madden	Jacob Roller
Edith R. Bricker	Claude Greco	William Menaker	Harry Stang
Stanley H. Bruckheim	Julius H. Greenberg	Arthur Morse	Isidore Sudarsky
Samuel Cohen	Orin R. Lamb	Benjamin Moscovitz	Floyd W. Terry
Jerome Colominsky	Howard C. Landin	Louis C. Mudie	Rudolf L. Thieme
Michael Edelstein	Julius Levy	John L. L. Nolan	James F. Wallace



### University of California, College of Dentistry.

At the annual commencement exercises of the College of Dentistry of the University of California, the degree of Doctor of Dental Surgery was conferred on the following graduates:

Thomas R. Block .....	California	Arthur Kazajian .....	California
James H. Browne .....	California	Marcel G. LaPlace .....	California
Paul F. Burke .....	California	Joseph E. Mathewson .....	California
Claude T. Cochrane .....	California	Max Peck .....	California
Leroy W. Hahn .....	California	Edward M. Seaman, Jr. ....	California
John M. Haley .....	California	Sanford J. Stein .....	California
Howard E. Hendricks .....	California	Clayton Westbay .....	California

### Georgetown University, Dental Department.

At the annual commencement exercises of the Dental Department of Georgetown University, held in Washington, D. C., on June 8, 1920, the degree of Doctor of Dental Surgery was conferred on the following graduates:

Frederick O. Appleton ..	New York	Abraham I. Phillips ....	District of Columbia
John A. Boston .....	Virginia	Morris M. Singer .....	District of Columbia
William A. Downs .....	China	William Sontag .....	District of Columbia
L. C. Faherty .....	District of Columbia	Edward W. Stebbins .....	Connecticut
Nathan Lesnie .....	District of Columbia	Morris Widom .....	District of Columbia
Emil Marks .....	District of Columbia		

### Laval University, School of Dental Surgery.

At the annual commencement exercises of the School of Dental Surgery of Laval University, held in Montreal, Can., the degree of Doctor of Dental Surgery was conferred on the following graduates:

Charles E. Beaulieu	Evance Duval	Charles A. Larue	K. Donatien Paquin
J. N. M. Brassard	Samuel H. Feldman	Geo. Laurencelle	Victor Parent
Jules Brière	L. P. Gariépy	J. E. Larouche	J. Geo. Pelletier
Lionel Brissette	Armand Gervais	Wenceslas Lebrun	Rodolphe Philie
J. U. F. Caza	J. A. Gustave Gouin	G. D. A. Loignon	Henri Provencher
Armand Clairmont	Fred. L. Hébert	Arthur Marchant	Anthime Racine
J. A. Côté	Arm. L. Ladouceur	J. B. Melançon	Anselme Roy
Clovis Denis	Gratien Landry	Ang. D. Milot	Rosaire Roy
Tel. Dupuis	Ernest Laporte	Maurice Morin	

### University of Louisville, College of Dentistry.

THE annual commencement exercises of the College of Dentistry of the University of Louisville were held in Louisville, Ky., on June 3, 1920.

The degree of Doctor of Dental Surgery was conferred on the following graduates:

William F. Albers .....	Wisconsin	John Lyman .....	Ohio
Roy W. Andrews .....	Canada	R. Halsey McCreedy .....	New York
Joseph M. Bosonetto .....	Illinois	Frank W. Mulcahy .....	Wisconsin
J. Duncan Burkes .....	Tennessee	Alvin S. Nicholson .....	Kentucky
Barnie B. Freedman .....	Ohio	William J. Oakley .....	Kentucky
Edward J. Greene .....	Ohio	Carl H. Tyler .....	Kentucky
Sampson S. Hanes .....	Tennessee	Morris Yamshon .....	Ohio
John D. Henderson .....	Kentucky	Louis C. Ziegler .....	Pennsylvania
Georgia D. Jones .....	Oklahoma	Frank S. Zurwell .....	New Hampshire
Tensard W. Kennedy .....	Ohio		

# SOCIETY NOTES AND ANNOUNCEMENTS

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## Coming Dental Society Meetings.

### National Meetings.

CANADIAN DENTAL ASSOCIATION. Ottawa, Ont. August 17th to 20th.

DELTA SIGMA DELTA FRATERNITY. Boston, Mass. August 23d.

NATIONAL ASSOCIATION OF DENTAL FACULTIES. Boston, Mass. August 20th and 21st.

NATIONAL DENTAL ASSOCIATION. Boston, Mass. August 23d to 27th.

NATIONAL SOCIETY OF DENTURE PROSTHETISTS. Boston, Mass. August 19th to 21st.

### State Meetings.

#### JULY.

INTERSTATE DENTAL ASSOCIATION. Buckroe Beach, Va. July 7th to 9th.

NEW JERSEY STATE DENTAL SOCIETY. Atlantic City. July 14th to 16th.

PSI OMEGA FRATERNITY (OHIO ALUMNI CHAPTER). Cedar Point. July 12th to 14th.

WISCONSIN STATE DENTAL SOCIETY. Milwaukee. July 13th to 15th.

### Examiners' Meetings.

ARKANSAS BOARD OF EXAMINERS. Little Rock. July 5th to 7th.

DELAWARE BOARD OF EXAMINERS. Wilmington. July 14th and 15th.

IDAHO BOARD OF EXAMINERS. Boise. July 13th to 16th.

MAINE BOARD OF EXAMINERS. Augusta. July 7th to 9th.

MONTANA BOARD OF EXAMINERS. Helena. July 12th.

## American Dental Library and Museum Association.

THE next annual meeting of the American Dental Library and Museum Association will be held August 23, 1920, 3.30 P.M., at the Forsyth Dental Infirmary, Boston, Mass.

At that session the official business will be taken up and a permanent constitution adopted. All societies, colleges, etc., applying before that time will be included as charter members.

Another session will be held later in the week to suit the convenience of the majority of members, when an interesting program pertaining to library and museum matters will be given.

Dr. Wm. Bebb will present a short paper dealing with methods of building libraries and museums and of conducting same.

Dr. L. Pierce Anthony, of the DENTAL COSMOS: Advisability of compiling a new dental bibliography, a standard reference list of books on dentistry published throughout the world. The last one compiled in this country was by C. G. Crowley in 1885.

Dr. B. W. Weinberger: Bibliography of Dental Periodicals published in the United States and Great Britain.

All those interested are requested to be present.

A. F. ISHAM, *President*,

B. W. WEINBERGER, *Sec'y-Treasurer*,  
40 E. 41st st., New York City.

## Canadian Dental Association.

THE Canadian Dental Association will hold its tenth biennial meeting in Ottawa, Can., August 17, 18, 19, and 20, 1920.

SYDNEY W. BRADLEY, *Sec'y*,  
206 Laurier ave., W., Ottawa, Ont.

## National Dental Association.

THE twenty-fourth annual meeting of the National Dental Association will be held in Mechanics Building, Boston, Mass., August 23 to 27, 1920.

The Mechanics Building is one of the largest in the United States for exhibition purposes of every description. It is over six hundred feet in length and covers over three acres of land, containing over 150,000 square feet of floor space, and is known all over the continent as the home of the far-famed "poultry, automobile, and dog shows, mechanics' and food fairs. World-renowned opera singers have entertained thousands of music lovers in the Grand Hall. Presidents and noted

speakers have addressed thousands of citizens of Massachusetts in this vast hall.

The Association is indeed fortunate to secure such a building for its meeting, as it assures ample room for clinics, demonstrations, and exhibits under one roof, with facilities for taking care of ten thousand members of the profession and guests.

F. E. JEFFREY, *Chmn. Pub. Committee*,  
Salem, Mass.

### National Association of Dental Faculties.

THE annual meeting of the National Association of Dental Faculties will be held at the Lenox Hotel, Boston, Mass., August 20 and 21, 1920.

C. C. ALLEN, *Sec'y.*

### National Dental Golf Association.

THE National Dental Golf Association was organized at New Orleans last October, and temporary officers elected.

The first tournament will be held in Boston on the Woodlawn Golf Course, Monday, August 23, 1920, during the meeting of the National Dental Association.

It is purposed to effect a permanent organization at that time. Officers will be elected, committees appointed, and suitable by-laws adopted.

It is desired that all members of the National Dental Association, interested in golf, should become affiliated. An effort is being made to supply such persons with application blanks. There is an application blank at the end of Chick Evans' article on "Why Professional Men Should Play Golf," published in the April issue of the *Journal of the National Dental Association*. Blanks may also be secured from the Secretary-Treasurer.

You should join the association whether you expect to attend the Boston meeting or not. The admission fee is \$3.00, paid but once, and no other fees will be charged except to those who participate in the tournaments.

While it is the intention of the Association to conduct an annual tournament at the time and place of the National Dental Association meeting, it is not proposed that it shall in any way interfere with the scientific program.

Any further information will be gladly furnished upon request.

F. M. CASTO, *Chairman*,  
Rose Bldg., Cleveland, O.  
RALSTON I. LEWIS, *Sec'y-Treas.*,  
25 E. Washington st., Chicago, Ill.

### National Society of Denture Prosthetists.

THE National Society of Denture Prosthetists will hold its second annual meeting in Boston, Mass., in the buildings of the Harvard University Dental Department, August 19, 20, and 21, 1920. Members of the profession interested in prosthetics are cordially invited to attend these sessions.

DAYTON D. CAMPBELL, *Sec'y*,  
Shukert Bldg., Kansas City, Mo.

### Delta Sigma Delta Fraternity.

#### ANNUAL MEETING.

THE thirty-sixth annual meeting of the Supreme Chapter of Delta Sigma Delta Fraternity will be held in the Copley Plaza Hotel, Boston, Mass., on Monday, August 23, 1920, at 9.30 A.M. Annual banquet at 6.30 P.M.

EDWIN T. DARBY, *Supreme Grand Master*,  
R. HAMILL D. SWING, *Supreme Scribe*,  
1623 Walnut st., Phila., Pa.

### Psi Omega Fraternity.

THE reunion and convention of Psi Omega Fraternity will be held at Cedar Point, Ohio, Monday, Tuesday, and Wednesday, July 12, 13, and 14, 1920.

E. L. PETTIBONE,  
Cleveland, Ohio.

### Wisconsin State Dental Society.

#### GOLDEN JUBILEE MEETING.

THE fiftieth annual (Golden Jubilee) meeting of the Wisconsin State Dental Society will be held in Milwaukee, Wis., July 13, 14, and 15, 1920.

W. F. FAUST, *Sec'y*,  
308 North ave., Milwaukee, Wis.

### New Jersey State Dental Society.

THE annual meeting of the New Jersey State Dental Society will be a celebration of its fiftieth anniversary. It will be held on Young's Million Dollar Pier, Atlantic City, N. J., on July 14, 15, and 16, 1920. The presence of men of national reputation will make it a memorable gathering.

Dr. W. W. Hodges, chairman of the Essay Committee, announces that Dr. Edward C. Kirk of Philadelphia, Dr. Otto U. King, secretary of the National Dental Association, Dr.



John V. Conzett of Dubuque, Iowa, president of the National Dental Association, Dr. Thomas B. Hartzell of Minneapolis, and Dr. Wayne Babcock of Philadelphia, will present able papers.

Dr. Frank L. Manning, chairman of the Clinic Committee, has arranged for study classes to be conducted by Dr. John V. Conzett on Gold Inlays, Dr. Thomas B. Hartzell on Pyorrhea and Prophylaxis, and Dr. Frederick Ream on the X-ray. In addition, general clinics will be given by men from the component societies, and also by clinical clubs.

Dr. Albert Kerr, chairman of the Exhibit Committee, is planning for the greatest display of dental goods and preparations ever shown at a dental convention. This exhibit alone will be worth visiting, and in conjunction with the other features will make the meeting the best in the history of the society.

All ethical practitioners are cordially invited to attend.

For a list of hotels or other information, address

F. K. HEAZELTON, *Sec'y*,  
223 E. Hanover st., Trenton, N. J.

### Interstate Dental Association.

THE seventh annual session of the Interstate Dental Association will be held at the Bay Shore Hotel, Buckroe Beach, Va., July 7, 8, and 9, 1920.

The program of three days of lectures and clinics will be conducted in the hotel pavilion, while the public meeting on the evening of the 8th will be held in Ogden Hall of Hampton Institute.

A special feature of this year's session will be a number by Dr. Hermann Prinz, Professor of Dental Materia Medica and Therapeutics in the Thomas W. Evans Museum and Dental Institute, School of Dentistry of the University of Pennsylvania.

W. H. WALLACE, *Sec'y*,  
128 N. Lee st., Salisbury, N. C.

### Montana Board of Examiners.

THE Montana State Board of Dental Examiners will hold their regular examinations at Helena, Mont., July 12, 1920. Applications should be in the hands of the secretary at least ten days before the examinations.

T. M. HAMPTON, *Sec'y*,  
Helena, Mont.

### Arkansas Board of Examiners.

THE next meeting of the Arkansas State Board of Dental Examiners will be held at Hotel Marion, Little Rock, Ark., July 5, 6, and 7, 1920, beginning promptly at 8 o'clock Monday morning, July 5th. For further information and application blanks, address

H. J. GREEN, *Sec'y*,  
Paragould, Ark.

### Delaware Board of Examiners.

THE next examination of the Delaware State Board of Dental Examiners will be held in Wilmington, Municipal Building, 11th and King sts., July 14 and 15, beginning promptly at 9 A.M. All applications must be in the hands of the secretary at least ten days before the examination. Full information may be received by addressing

W. S. P. COMBS, *Sec'y*,  
Middletown, Del.

### Idaho Board of Examiners.

THE next regular examination for the dentists will take place in the Capitol Building, Boise, Idaho, on July 13, 1920. The examination will extend over a period of four days.

Changes have been made in the administrative features of the Idaho Dental Law, whereby this department assumes those duties with the assistance of the dental committee or board, consisting of five dentists, the department handling the administrative features while the committee handles the professional features, such as conducting of examinations, granting of reciprocal licenses, adoption of educational requirements, etc.

All inquiries should be addressed to the Department of Law Enforcement, Boise, Idaho.

PAUL DAVIS,  
*Director*, Bureau of License,  
Department of Law Enforcement,  
Boise, Idaho.

### Maine Board of Examiners.

THE regular meeting of the Maine Board of Dental Examiners will be held at the State-house, Augusta, Me., July 7, 8, and 9, 1920, beginning at 8.30 A.M., July 7th.

All applications must be in the hands of the secretary on or before June 28, 1920. Fee for examination—dentists, \$20; dental hygienists, \$10. Any further information and ap-

plication blanks will be furnished by addressing

HENRY GILMAN, *Sec'y*,  
192 State st., Portland, Me.

# UNITED STATES PATENTS

## PERTAINING TO OR APPLICABLE TO DENTISTRY

ISSUED DURING MAY 1920.

### *May 4.*

- No. 1,338,821, to M. EISNER and A. M. FREEMAN. Rotary toothbrush.
- No. 1,338,905, to ALBERT C. CLARK. Anesthetic apparatus.
- No. 1,338,918, to RUPERT E. HALL. Dental articulator.
- No. 1,338,959, to LEON L. POSTON. Artificial tooth.
- No. 1,339,265, to NATHAN A. LEVITAN. Toilet article.
- No. 130,650, to A. BOURJOIS and Co., INC. Trade-mark for tooth, nail, hair, bath, and face brushes.
- No. 130,679, to THE COLUMBUS DENTAL MFG. Co. Trade-mark for artificial teeth.
- No. 130,951, to WILLIAM G. TURNER. Trade-mark for tooth filling.
- No. 130,963, to USONA DENTAL Co., INC. Trade-mark for burs and broaches made of steel and used with dental hand-pieces for preparing cavities.

### *May 11.*

- No. 1,339,640, to JOHN WILLIAMS. Dental plate or denture.
- No. 1,339,812, to ISRAEL J. DRESCH. Dental-plate attachment.
- No. 1,339,821, to RUPERT E. HALL. Artificial teeth.
- No. 1,340,089, to ARTHUR S. STONE. Removable bridge for dental work.
- No. 1,340,093, to JAMES S. WESTHAFFER. Toothbrush.
- No. 1,340,115, to CLAYTON P. BREINING. Fountain toothbrush.
- No. 55,143, to E. H. WIERSCHING and E. K. WIERSCHING. Design for toothbrush casing.

- No. 131,308, to ARTHUR M. FLOOD. Trade-mark for medicinal preparation to be used as a dentifrice.

### *May 18.*

- No. 1,340,213, to IRA A. BURNETT. Gold-saving receptacle.
- No. 1,340,354, to PERCY N. WILLIAMS. Odontometer.
- No. 1,340,448, to W. A. JOHNSTON, A. W. BROWNE, and F. L. WALLACE. Anesthetic administering apparatus.
- No. 1,340,760, to GEORGE B. EHRLIG. Rotary toothbrush.
- No. 131,424, to ALFONSO CARRERAS. Trade-mark for toothpaste.
- No. 131,538, to THE LORENZ Co. Trade-mark for perfumes, toothpowder, toilet powders, toilet waters, toilet creams and lotions, and hair tonic.
- No. 131,540, to THE LORENZ Co. Trade-mark for toothpowder and footpowder.
- No. 131,575, to ARNOLD B. PETERS. Trade-mark for toothpowder.
- No. 131,681, to FREDERICK H. YOUNG. Trade-mark for toilet cream, facepowder, talcum powder and toothpowder.
- No. 131,682, to FREDERICK H. YOUNG. Trade-mark for toilet creams, facepowder, talcum powder and toothpowder.

### *May 25.*

- No. 1,340,908, to O. H. and A. F. PIEPER. Dental engine.
- No. 1,340,959, to WILLIAM L. JONES. Dental massage tool.
- No. 1,341,107, to WALTER G. BRIDGE. Universal dental pliers.
- No. 1,341,191, to ICHIGORO NAKAHARA. Dental articulator.







DR. CHARLES MONROE BAILEY.

# THE DENTAL COSMOS

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## ORIGINAL COMMUNICATIONS

### Dental Caries.

By PERCY R. HOWE, D.D.S., Boston, Mass.

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THE most vital subject to dentistry is the conservation of the teeth. The teeth are essential to health. The full complement of teeth and their proper arrangement are factors in the development of the facial and nasal anatomy of the growing child. They are the only organs that prepare food for its first step in digestion and assimilation. This first step neglected, the rest of the alimentary-process must proceed under stress to the detriment of the entire economy. It is true that we replace lost teeth by ingenious substitutes, but the most skilfully prepared device is crudeness itself compared with the works of nature. We have heard too much about the teeth as disease factors. We must study diseases of the teeth for the sake of the teeth themselves, and act to intelligently preserve these important organs.

#### MILLER'S THEORY OF DENTAL CARIES.

The most generally accepted theory of dental caries is that of Miller. Miller

held that fermentation of carbohydrates with the formation of lactic acid was the cause of tooth decay. He based his ideas upon the following experiment: Teeth were placed in a fermenting mixture of bread and saliva, which was renewed from time to time that it might not become alkaline. After three months he obtained effects upon some of the teeth which he stated could not be told either macroscopically or microscopically from true decay. By zinc crystallization he demonstrated the presence of lactic acid. He felt that he had proved his theory.

Miller did not attempt to produce decay in animals. His microscopical studies were confined to the carious mass alone.

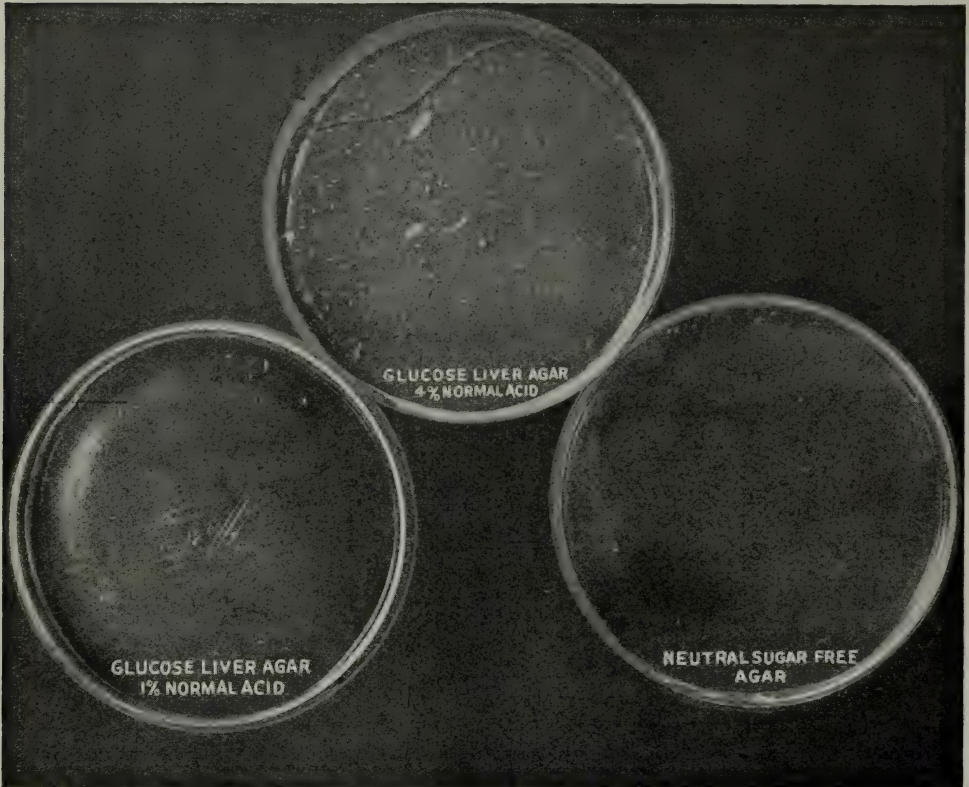
I have repeated and extended his experiment. I placed teeth in fermenting mixtures of dextrose, maltose, lactose, saccharose, dextrin, white flour, and bread. In some of the tubes I used saliva from individuals that had extensive tooth decay, in others from cases

that had no decay, and in still others from mixed cases. After from six months to one year the enamel has an etched appearance in some of the teeth. It is quite entire in certain teeth; in others the etched appearance occurs in spots; while in others no effect can be

color, but is acid eaten. In the majority but little if any effect is noted.

In any case there is no regularity in effect. No cavities were found. The carious saliva seems to have produced no more effect than that of the immune. It would seem from this experiment that

FIG. 1.



Cultures from mouths of sugar-fed guinea-pigs. Heavy growth on glucose-liver agar, 4% acid. Slight growth on glucose-liver agar, 1% acid. No growth on neutral sugar-free agar.

detected, even under magnification. The enamel remains hard and glossy. The effect is apparently what we should expect from placing teeth in diluted acid solutions. The effect upon the roots of the teeth also varies. In a few of the teeth the tissue has become discolored, and is slightly softened. In one deciduous tooth the root still holds its white

the most pronounced thing to be noted is the great dissimilarity in the structure of the teeth themselves. This is also borne out by any attempt at decalcifying teeth. Some teeth decalcify quickly, others are not fully decalcified after long treatment. That teeth vary in structure is unquestionable. Both decalcified and ground sections of teeth



histologically show this. Teeth vary in size, in color and in form. Decalcified teeth show marked differences in the remaining organic tissue.

FIG. 2.



Dental caries. One upper incisor broken off, both lower incisors decayed and broken.

The teeth are living organs and slow changes occur in their structure through life. After protracted illnesses the dentin often becomes quite soft, and slowly

FIG. 3.



Cariou jaw produced by deficient diet.

regains its hardness with the recovery of health. During pregnancy the structure of the teeth changes. The amount of organic tissue in a tooth may be seen from a study of tooth sections. It may

further be seen in that decalcified teeth retain their form, while if the organic material is removed or destroyed by KOH or NaOH the tooth crumbles to pieces. With protracted heating it also

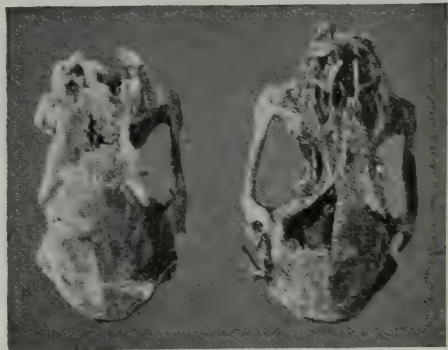
FIG. 4.



Cariou jaw. Carious spots on teeth.

becomes quite crumbly. The brittleness of dried teeth is familiar to all. It is not definitely known how the inorganic substance in the teeth is bound. It is evident, however, that it is held in place

FIG. 5.



Cariou skulls. Deficient diet.

largely by the organic material, probably in a colloidal-crystalloid combination. The structure of the tooth is a very important factor in decay, and must be considered fully as much as the fermentative process.

## ANIMAL EXPERIMENTS.

If Miller's theory is sound it should be a perfectly simple matter to produce decay in the teeth of animals. I fed guinea-pigs with very excessive amounts of sugars and starches. Their food con-

ered with adhesive masses of the sugars and starches. They were very dirty, but no decay could be detected. The oral bacterial flora became distinctly aciduric in character. No growth was obtained upon neutral glucose-agar, while upon a four per cent. acid glucose-agar a good growth occurred. (See Fig. 1.) I also fed these animals with the micro-organ-

FIG. 6.



Case No. — (Fetler). Age thirteen; weight 129½ lbs.; height 5 ft., 4½ in.; average weight for height and age 112 lbs.; overweight 17½ lbs.; fine physical condition; no decay.

sisted of milk, rolled oats, carrots and green stuff. The sugars were incorporated into their food. In one lot so fed from nine months to a year I used eighteen animals. Three were fed dextrose, three maltose, three lactose, three saccharose, three dextrin, and three white flour. The teeth were continually cov-

FIG. 7.



Case No. — (Fetler). Teeth of boy shown in Fig. 6.

isms that we had isolated from tooth decay, *B. acidophilus*, *B. (x)*, *B. ramosus*. No effect was observed either upon the teeth or upon the health of the animal.

The regulation of the oral flora is largely concerned with the matter of diet. Just as changes in the intestinal flora may be brought about by different diets, so may changes in the oral flora be produced and governed. In the sugar-fed pigs we have an alteration in the character of the bacterial flora. It becomes aciduric. In our studies of the

bacteria in dental caries we have found aciduric bacteria constantly present. The flora in the mouths of the sugar-fed animals seems similar to the flora found in caries. Still, no caries has occurred.

FIG. 8.



Case No. 63475. Age thirteen; weight 55 lbs.; height 4 ft., 2 in.; average weight for height and age 66 lbs.; underweight 11 lbs.; poor teeth.

#### PRODUCING TRUE DECAY IN TEETH OF ANIMALS.

I have, however, been able to produce what I believe to be true decay in teeth of animals by feeding diets that are deficient in respect to the food accessory substances. Much work has been carried out upon the subject of vitamins,

and infinitely more remains to be done, but the dental effects are pronounced and distinct and have not been produced by any other experimental means. I have shown elsewhere absorption of the alveolus with a condition similar to pyorrhea. I have also shown carious jaws and carious head bones brought about in this same manner. Mrs. May Mellanby,\* in connection with the work done by her husband upon rickets, has shown dental irregularities in pups brought about in the same way.

FIG. 9.



Case No. 63475. Teeth of boy shown in Fig. 8.

By feeding young guinea-pigs diets that consisted mainly of fat-free milk and rolled oats, with as little as possible of foods containing the food accessory elements, and by continuing this over a considerable period, I have been able to produce caries and irregularities. In one young pig, for example, the lower incisors decayed first and broke off, then one upper incisor showed progressive decay and broke off half-way to the gum. Later the other incisor decayed and also broke. (See Fig. 2.) The

\* "The Influence of Diet on Teeth Formation." *Lancet*, London, Dec. 7, 1918.



only way that the animal could eat was to have his solid food cut into small pieces and placed in his mouth posteriorly to his incisors. By careful feeding of food containing the proper elements I was able to arrest the carious and softening process, and in time the animal began to

is severe and the action rapid, and the molars become very soft, often being bent by the act of mastication. It becomes very difficult for the animals to eat, and it is only by individual attention to them that it is possible to feed them.

This softening and carious dental effect is distinct and unmistakable. It may be produced with regularity. The

FIG. 10.



Case No. 13819. Age thirteen; weight 108 lbs.; height 5 ft., 1 $\frac{1}{4}$  in.; average weight for height and age 91 lbs.; overweight 17 lbs.; old case.

gain in weight and to eat quite well. The lower teeth became very irregular and were crossed. Change of diet again inaugurated a new period of decay.

In another animal both upper incisors have extensive decay. There are carious places in the molars. Many of the animals break off their teeth. The process

FIG. 11.



Case No. 13819. Teeth of girl shown in Fig. 10.

feeding of sugars in connection with the deficient diets seems to produce no effect upon the teeth. It may possibly have a slight protective effect upon the animal. This seems to be so in animals that are somewhat older than the ones used for the purpose of studying caries.

There are many other interesting conditions that accompany these studies. Eye troubles are frequent, and are cured by correcting the diet. The loss of the

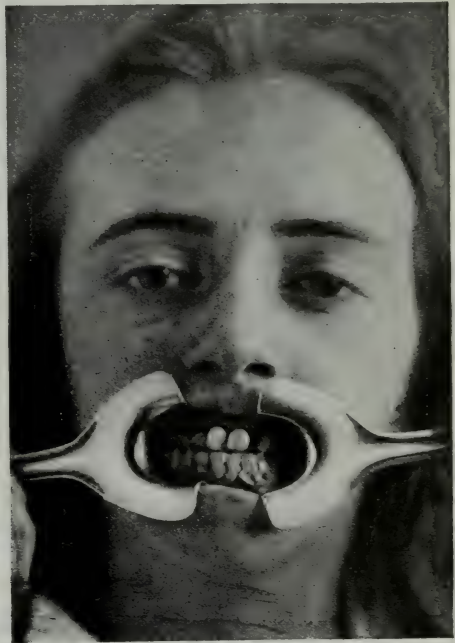
use of the legs occurs, but is regained with dietary correction. Rheumatic conditions are brought about, and disappear in the same way. The animals are open to many infections. These and other conditions are familiar to all students of this subject. In bringing the animals back from a state in which their hold upon life is critical we resort to

I am unable to say at the present time which of the vitamins are the most responsible for this dental effect. Very likely the deficiency of all three is responsible for the trouble. The discussion of this I shall reserve for a subsequent paper. Degenerate changes are promptly seen by histological examinations. This also I shall reserve for

FIG. 12.



FIG. 13.



Case No. 22337. Age fifteen; weight 77 lbs.; height 4 ft., 11 in.; average weight for height and age 97 lbs.; underweight 20 lbs.; very poor teeth.

giving them the antiscorbutic vitamin. They are fed orange juice with a medicine dropper. This they take with great avidity. Whole milk is warmed and fed to them. They also begin to eat grated or scraped carrot. After a day or so they are able to eat small but thin shavings of carrots and a little lettuce. In this way they obtain the fat-soluble and the water-soluble vitamins.

another paper. The work of Zilva and Wells\* is of great interest in this connection.

If we turn to the clinic for the study of dental caries, it is entirely evident that something besides the mere fermentation of sugars and starches lies behind

\* ZILVA, S. S., AND WELLS, F. W. *Proc. Roy. Soc.*, 1919, B. 90, 505.

# Examination for Dental Caries In Children of Different Nationalities.

	Russian <small>Cases 57 - ages 6-12</small>	Italian <small>Cases 54 - ages 5-14</small>	French <small>Cases 5 - ages 1-14</small>	American <small>Cases 270 - ages 4-14</small>	Jewish <small>Cases 111 - ages 7-15</small>	Scotch <small>Cases 27 - ages 10-14</small>	Swedish <small>Cases 31 - ages 3-15</small>	German <small>Cases 24 - ages 6-16</small>	Irish <small>Cases 191 - ages 4-16</small>	English <small>Cases 57 - ages 4-15</small>
Permanent Upper Teeth										
12 year Molars	1	25	3	168	65	13	17	17	153	55
6 year Molars	10	83	7	441	188	42	53	49	316	103
2 <sup>nd</sup> Bicuspid	2	11	1	64	76	7	16	12	125	33
1 <sup>st</sup> Bicuspid	2	10	1	180	76	8	23	15	120	46
Cuspid	—	1	—	17	9	1	3	2	17	5
Laterals	2	12	—	137	85	16	19	16	112	42
Centrals	2	12	2	151	74	29	20	13	137	44
(Total)	19	154	16	1242	561	116	150	124	880	328
Permanent Lower Teeth										
12 year Molars	1	36	6	196	96	32	22	23	180	64
6 year Molars	11	94	8	451	202	46	57	47	365	112
2 <sup>nd</sup> Bicuspid	2	7	1	97	44	13	12	6	103	30
1 <sup>st</sup> Bicuspid	—	2	—	45	27	4	3	3	30	12
Cuspid	—	—	—	6	5	—	—	2	5	1
Laterals	1	1	—	22	8	—	4	3	24	7
Centrals	1	2	—	31	5	—	5	5	29	10
(Total)	16	142	16	848	387	95	103	89	756	236
Deciduous Upper Teeth										
2 <sup>nd</sup> Molars	5	31	2	159	52	5	16	11	70	15
1 <sup>st</sup> Molars	1	25	1	85	15	3	15	12	48	12
Cuspid	—	17	1	46	10	—	2	3	61	7
Laterals	—	1	1	13	7	—	2	3	3	5
Centrals	—	2	1	11	7	—	5	2	2	4
(Total)	6	76	6	314	91	8	40	31	184	43
Deciduous Lower Teeth										
2 <sup>nd</sup> Molars	2	28	1	121	33	2	9	9	48	17
1 <sup>st</sup> Molars	3	25	2	107	23	1	7	6	49	7
Cuspid	—	5	—	24	5	—	2	1	10	6
Laterals	—	—	—	2	2	—	—	—	—	3
Centrals	—	—	—	2	—	—	—	—	—	—
(Total)	5	58	3	256	61	3	18	16	107	33
Total Percent	23%	28%	29%	35%	35%	33%	35%	35%	36%	39%



tooth decay. When we study the large dental clinic of this institution as a whole, where we deal with from fifteen hundred to two thousand children a week, we see every evidence of faulty and deficient nutrition. All this, too, is at a period of development. The dental decay is wholesale. Many of the children are undersized, or growth goes on in an irregular manner, with great length of limbs and no breadth of body. Or children are occasionally too fat, with flabby flesh. Many are pale and anemic. Nervous disturbances are very evident. Eye and skin troubles, tonsil enlargements and adenoids are prevalent. Rickets in all stages, and other bone defects are all too readily found. Speaking in a general way, we cannot say that the teeth cause the tonsil trouble or the nervous condition, or *vice versa*, but it is evident that a search should be made for broader and more fundamental principles that lie behind all these things. Like tooth decay, all these conditions are the result, or they are the diseases, of life in civilized communities. It is evident too that the most perfect teeth accompany a vigorous and sound body. Examination of the accompanying illustrations shows this. There is but little to be found to confirm an opinion that the mere fermentation of carbohydrates is the sole cause of tooth decay. Some of these children have extensive decay. Others are entirely free from it, and have never received dental care nor used a toothbrush.

The table on page 928 shows the comparative amount of dental decay that has occurred in the teeth of children of different nationalities. The difference in percentage of decay is not large. People of widely different characteristics and from different parts of the world, brought together under similar conditions of life, have the same dental disturbances, although in their native lands some of these races are comparatively free from them. These statistics are

from children of the poorer people of city life.

The present theory of dental caries leaves much to be explained. The theory has been constructed upon incomplete evidence. Miller was never able to produce caries according to his theory in animals. He wonders why the teeth of pigs that live largely upon fermentable mixtures are comparatively free from decay. He believes that it must be in the structure of their teeth. Miller states that always in advance of the softened carious mass a transparent zone of dentin exists. Such zones in tooth roots mean a structural change, a degenerative change. Miller shows sections of teeth, and what he terms masses of micro-organisms at a magnification of only fifteen diameters. The usual magnification for studying bacteria is about one thousand diameters. He shows other specimens at a magnification of only four hundred diameters, and terms what seem to me broken tubuli and their fibrils or contents, bacteria. Bacteria are certainly present, but so are many other things. Whether the bacteria are the actual cause of the decay remains to be proven. Feeding fermentable starches and sugars does not produce decay in guinea-pigs at the end of a year, although their teeth have been continually covered with the fermentable material. Feeding the bacteria from the decayed teeth does not produce decay nor affect the animals.

Feeding diets that are deficient in respect to their vitamins does produce decay of the teeth in young animals, and in some of the older animals. Diets deficient in this respect also produce carious areas in the process and in the jaws. In some cases the entire bones of the head were carious. It makes no difference whether these disturbances are the result of an irregular calcium metabolism or the result of an infection, the control lies in the diet.

10 EXETER ST.

## The True Case of the Dental Hygienist.

By ALBERT H. STEVENSON, D.D.S., New York City,

PROFESSOR OF PREVENTIVE DENTISTRY, COLUMBIA UNIVERSITY.

(Read before the Academy of Stomatology of Philadelphia, March 23, 1920.)

I SHALL not presume to insult the intelligence of the members of this Academy by offering a dissertation upon the value of preventive dentistry; rather, will I concentrate upon the immediate problems and their attendant responsibilities that rest upon you as guardians of the oral health of a portion of the great Commonwealth of Pennsylvania.

These responsibilities have become especially heavy at this time, in view of impending legislation in this State which contemplates incorporating in the dental law provisions for licensing women as dental hygienists.

As well as I can ascertain the facts, there exists among the opponents of the new law but few men committed by prejudice to opposition to the measure, while on the other hand, there are a number who oppose it because of lack of understanding of what the dental hygienist is trained for, and what she has accomplished.

To these men will I direct my remarks, and endeavor through the maze of misrepresentation that has befogged them to present from authentic data facts that will prove that not only has the dental hygienist passed her period of probation but has more than justified her existence.

Latest available figures indicate that nearly two million persons are living in Philadelphia at the present time. Of these over three hundred thousand are children between the ages of six and sixteen. This number includes those attending the public schools, parochial schools, as well as the private educational

institutions of the city. If the conservative average of five cavities per child be applicable here examination would reveal the presence of carious teeth to the number of a million and a half in these mouths. These carious teeth vary in their involvement from those with incipient cavities to those with hopelessly abscessed roots. This is a situation that is being conscientiously combated by the members of the dental profession here in their private offices and in such dental clinics as have been established. Would subsequent monthly examination show an appreciable reduction of this most common physical defect, or satisfactory diminution of the total number of cavities? I fear not; so let us direct our attention to the measures taken for prevention.

Relatively few dental practitioners have their patients on a periodic appointment basis, and for most obvious reasons. The overwhelming demand for remedial service and for restoring that function so necessary for health, forbids. The dentist is the dental physician as well as prosthodontist, and as such has his time fully occupied. As a preventer of dental lesions he is seldom considered, and yet this should be his enviable distinction. That he consigns a portion of the work to a trained assistant is a secondary consideration, the fact remains that it is his obligation and his responsibility to see that it is performed.

### THE FIELD AND LIMITATIONS.

The value of periodic prophylactic treatment in destroying bacterial plaques



on the surface of the teeth is substantiated by research and investigation. After agglutination, the plaque is so tenacious as to resist removal by the most persistent use of toothbrush and dentifrice by the patient, and being usually invisible is not detected until decalcification of the enamel has occurred and the initial lesion presents. Alas! even this stage often remains undiscovered, and it is not until the incipient cavity is in evidence that dental relief is sought. Intelligent use of the porte-polisher by the dental hygienist will materially reduce these lesions in the normal mouth. The periodic removal of the plaques is a preventive measure that should not be disregarded.

The average mouth presenting for treatment to the oral surgeon periodontist, or to the orthodontist (to say nothing of the general practitioner) is usually unfit for his ministrations. In crustations of salivary calculus, containing decomposing food, bodies of dead bacteria as well as living organisms engaged in active proliferation, are present. To operate in such a mouth is to violate the laws of asepsis, and even a cavity preparation or an impression taken under these conditions indicates a disregard of the health of the patient. The salivary deposits should be removed with the accompanying debris; in short, the field of operation properly prepared. *This the dental hygienist can and should do*; a procedure entirely consistent with and contributing to the dignity of the dentist's efforts and comparable to the preparation of the field of operation for a general surgeon by his medical nurse. The licensed medical nurse has long been permitted to do this and no one has expressed the fear that some day, with the increasing number of votes for women, she will seek legal permission to take the scalpel in her own hand and perform the operation herself.

The dental hygienist is the sanitary aide of the dentist and can assume these duties without imperilling dental practice. On the contrary she will become as invaluable as such aides of the gen-

eral surgeon as the pharmacist, the dietary expert or the medical nurse.

Most of the State laws limit the work of the hygienist to the "removal of stains and accretions from the exposed surface of the teeth" or "under the free margin of the gum." Why should we be so fearful because in her perfectly legal perambulations she approaches the sacred gingiva? As a practicing periodontist I yield second place to no man in my respect for the investing tissues of the teeth, but with all logic and consistency I ask why the dental hygienist endangers the profession of dentistry because the hygienic operation of the removal of calcaric deposits and debris has a beneficial effect upon the periodontium.

From the very first, the student preparing to become a dental hygienist has had impressed upon her that "her efforts should be limited to the plus side of the oral health line," and she should not treat the pathological. I anticipate the question, What is to prevent her from yielding to an impulse to investigate pyorrhea pockets, curet roots and otherwise infringe upon the province of the periodontist?

By training her in the use of instruments designed for purposes within her field and educating her to a professional respect for those tissues beyond her province. This is being done in the schools at Rochester and Forsyth, Columbia University and elsewhere.

#### EDUCATION.

A member of the National Educational Council stated before your State Society last April:\* "I know of no one who objects to her (the dental hygienist) coming if she attain the standard of education and training that the environment she is called on to enter requires and demands." It would be most unfortunate for the oral hygiene propaganda if these young women were poorly trained and inadequately equipped for the work

\* DENTAL COSMOS, Vol. lxi, 1919, p. 1211.



they are called upon to perform. The standards for her education are in a state of evolution and deserve consideration by all those experienced in dental education. The course which she is required to traverse should be consistent with the dental course and should meet the demands of all interested in higher dental education. In these early stages there is an opportunity for a uniform curriculum in all the schools that will not be possible at a later period.

Should the dental hygienist be educated in the dental college building? This question propounded to the deans of twelve of the leading dental colleges resulted in eight affirmative and four negative replies, an evidence of a desire to associate the dental hygienist with the dentist even in training. By this association and environment she would have a growing respect for dentistry and all that it embraces, and would more fully appreciate her own limitations. This has been recognized by the University of Denver, Columbia University, University of Minnesota, and the directors of the Forsyth Infirmary, for by the recent affiliation with Tufts College, the Forsyth School becomes the Forsyth-Tufts School for Dental Hygienists.

The course of training should at least cover one collegiate year before graduation and if a State law could be so constructed that graduates would be compelled to serve in recognized municipal or institutional dental infirmaries for another year before the granting of their license, a continual supply of available workers would be assured. This is successfully applied to school-teaching and other callings, but would of course require strict supervision.

Her preliminary education should consist of four years high school or equivalent, and credentials of character should be submitted before admittance. Preference should be shown those women who come from the professions of teaching or medical nursing, but excellent material originates in the dental office, where the office assistant with creditable ambitions seeks to broaden her sphere of usefulness. The theoretical subjects

should be those necessary to give her an intelligent grasp of the importance of her calling, and of its relation to the work of the dentist. While the essayist can learn of no objection to the lectures being given by members of the faculties of dental and medical schools, the efforts of at least one college to train dental hygienists in the same classes with dental students has been most unsatisfactory.

Practical work should consist of a course in tooth morphology, training in manual dexterity being obtained simultaneously with a knowledge of tooth form. The carving of blocks by hand fulfils this purpose. The operative technique on manikin heads as taught in Columbia University consists of three weeks' intensive training, with the use of porte-polisher and wood points until the technique is acquired. The student is then taught instrumentation for three weeks more on the manikins. When she has demonstrated the necessary aptitude she is permitted to give prophylactic treatments to patients in the infirmary and devotes the remainder of the course to infirmary practice. As a result of this intensive training in specialized work, she emerges a skilful, intelligent assistant ready to serve under the guidance of the dental practitioner. An important part of her training has been lay education and she is prepared to give demonstrations in oral hygiene either in the private office or in the class room.

#### STATE LAWS.

Since the legalizing of dental hygienists by statute in the State of New York in 1916, Connecticut, Massachusetts, Iowa, Maine, Colorado, Minnesota, New Hampshire, Oklahoma, Tennessee and Michigan have passed similar laws; and legislation is now pending in Illinois, California, North Carolina and Pennsylvania. With the exception of New Hampshire, Massachusetts, Colorado and Michigan, the laws limit this field to women and there is no evidence that even in these latter States will the State Examiners permit men to qualify.

Some of the State Laws designate them as dental hygienists, others as dental nurses. As the word nurse is defined as \* "one who cares for or tends" and the word hygienist \* "one versed in hygiene or the rules of health" either of these appellations is quite appropriate. While the preliminary education varies in the different States from one to four years' high-school work, there is a rather fortunate tendency in the more recent enactments to require four years, assuring a higher type of matriculant to the schools. Prior to the passage of the law in New York State the contention was made, particularly in New York City, that these women if legalized could not be restrained. New York City had been a scandal in the eyes of the dental world because of its illegal dental practitioners. Its cosmopolitan population, combined with weak penalties in the law, made detection difficult and conviction no great hardship. It is difficult to conceive more unfavorable circumstances under which to introduce persons legalized to perform oral prophylaxis but prevented from doing more. But the same law that legalized the dental hygienist defined dentistry most concisely, and made annual registration compulsory for both hygienist and dentist. Over a period of four years there has yet to be reported one violation of the law by a dental hygienist.

These laws have been a direct result of the education of the public in the care of the mouth and an appreciation of the relation of the teeth to systemic disease. The slogan "*pro bono publico*" is a powerful stimulant to the indifferent lawmaker, and *what the public wants it usually gets!* Professional opposition notwithstanding. It is as important that legislation concerning the dental hygienist be directed by the dental profession as it is that she should be trained in a professional environment. One of the aims of the National Dental Association for this year is† "Dental Hygienists recognized in every State." While the ful-

filment of this aim can hardly be expected in such a short space of time it is as certain as prohibition and, as the late Professor Osler believed, is of far greater importance.

#### SERVICE.

With a determination to have the school children of Bridgeport, Conn., receive the periodic prophylactic treatments that he had so successfully applied to his private patients, and with the conviction that this was the logical means to check the ravages of dental caries, Dr. A. C. Fones trained an experimental class of dental hygienists in 1913. Despite professional antagonism, and with little encouragement from the municipal authorities, he selected an eminent faculty, a number of universities contributing to this first teaching staff.

The young women in the first group of students consisted of medical nurses, school teachers, several dentists' wives, and a number of dental office assistants. At his own expense Dr. Fones converted his spacious garage first into a lecture room and then into a dental infirmary; and to it came the children of Bridgeport. This was the first public service rendered by dental hygienists. I use the words "public service" advisedly, and qualify its use as indicating all the public, rich and poor, from the well-cared-for child of the prosperous citizen to the ragged urchin of the tenement. Humanitarianism should draw no class distinction, and its benefits should be conferred upon all mankind. Who should receive it first is but a matter of local expediency.

In New Zealand a prominent health worker (Dr. Truby King) devoted his energies in first giving treatment and instruction in hygiene to children of the rich, and after these salutary measures he had little difficulty in obtaining ample funds to extend the work to the poor.

Dr. Fones' initial effort was more than an experiment, it was a forceful demonstration that was soon appreciated by the municipality. This appreciation was

\* Webster's Dictionary.

† *Journal of the N. D. A.*, Jan. 1920.



evidenced by an appropriation of \$5000 to test the value of the preventive program in the schools. The monetary sacrifice to Dr. Fones in initiating this work was great, and was exceeded only by the energies expended by this courageous pioneer in inaugurating a system of instrumentation and polishing and in personally training the students in its technique. He has always foregone professional and social obligations to answer the call from any part of the country for elucidation upon this subject so dear to his heart.

The record of the five years' work of these dental hygienists in the schools of Bridgeport is the most forceful argument for preventive dentistry ever presented. It has been a topic of discussion among educational authorities as well as health workers throughout the land.

There were four distinct parts to the system. First, prophylactic treatment, or the actual cleaning and polishing of the children's teeth and chart examination of the mouths. Second, toothbrush drills and classroom talks. Third, stereopticon lectures for the children in the higher grades; and Fourth, educational work in the homes by means of special literature for the parents. The prophylactic treatment consisted mainly of the thorough cleaning by means of orangewood sticks in hand polishers, of every surface of every tooth. This meant that the dental hygienist would remove all stains and accretions from the surfaces of the teeth, and especially the mucilaginous films known as bacterial plaques, which are the initial step of dental decay. The treatments were given in the schools, the equipment being both portable and adapted to almost any location. Every child received the same treatment regardless of the financial status of the parent; in short, this preventive system was incorporated as a part of the school curriculum.\*

During the period covered 125,950 prophylactic treatments were given to children, and the latest records show that of the 127 dental hygienists registered in Connecticut, forty-seven are en-

gaged in public school work, hospitals, dispensaries or factories. During the progress of the war many hygienists volunteered their services in the evening and gave 800 prophylactic treatments to men drafted into service. This is a record of which Connecticut might well be proud.

In New York State inadequate appropriation of funds has prevented such an enviable record. The city of Rochester can show the best result aided by the Rochester Dental Dispensary. Under date of March 9th, a communication from Dr. H. J. Burkhart to the essayist reads as follows:

I could not tell you the number of prophylactic treatments given in Rochester by dental hygienists, because until this year a considerable amount of the prophylactic work was done by dental internes employed here in the Dispensary. Since January 1st the prophylactic work in the schools has been done by graduate dental hygienists and by students from the Dispensary school. I expect before the 1st of July the dental hygienists will have done, from January to July, around 35,000 mouths.

At the present time there are seventeen graduate hygienists and forty-two students at work in the schools of Rochester.

You probably will be interested to know that since I have called in the graduate dentists who have heretofore done the work, I have had fewer complaints and less trouble than at any time since the work was started here. The work of the young women and their conduct generally in the schools is very much more satisfactory than when the men were employed. I am hoping to secure enough graduates from this year's class so that in the future I shall not be obliged to use graduate dentists again to do this work.

In New York City the municipality has been slow to provide funds to engage dental hygienists in the schools. As a result there are about sixty engaged in private practice with dental practitioners. Four others are in the service of the Department of Health; five are in the Dental Department of the Metropolitan Life Insurance Company; six are in charitable organizations, a total

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\* "Report of Five Years of Mouth Hygiene." DENTAL COSMOS, July 1919.



of fifteen in welfare work. Twenty-five members of the alumni association of Columbia University, all engaged in private practice, have volunteered at least one morning per week for service in the public schools. As many of these young women are engaged by private dentists on a time basis, the service is a most commendable one. The undergraduate dental hygienists have given over 1000 prophylactic treatments in the Italian district this year and almost half the class have indicated their intention of entering public work after graduation. One of our graduates sacrificed an excellent position to demonstrate the value of the dental hygienist at Mt. Alto in this State, in response to the call of Dr. Beck. In four years students in oral hygiene from Columbia University have given over 15,000 prophylactic treatments.

In Massachusetts records show but two dental hygienists doing work in charitable institutions and two in the public schools, and Dr. Harold DeWitt Cross writes that the reason for this is that "those who are most strongly in favor of legislation for the practice of dental hygienists have done nothing to promulgate the service in public health work." This is most unfortunate, and while not conversant with the reasons I believe it is but a question of time when, with the increasing number of graduates from the Forsyth-Tufts School, there will be many more available, if opportunity is offered. The undergraduate dental hygienists have given about 17,200 prophylactic treatments in Boston in the last three years. Statistics from the other States are not available to the essayist, but it must be borne in mind that their legal enact-

ments are so recent that organized efforts could hardly have been tabulated.

#### RECAPITULATION.

To summarize in concrete form what I have endeavored to present:

1st. The dentist as the guardian of the oral health of the community can no longer disregard preventive measures as a part of daily practice.

2d. The prevalence of dental caries should be minimized by systematic oral prophylaxis under the direction of the dentist.

3d. If the burden of other professional duties prevents the dentist from giving this service he should acquire adequate assistants.

4th. The dental hygienist should be properly trained and regulated by law. Wherever she has been given opportunity she has met all expectations.

5th. Whether she labors in private office or public institutions she is rendering humanitarian service and the future distribution of her labor will ultimately be adjusted by the law of supply and demand.

6th. The dental hygienist is an important factor in the progress of dentistry and the elevation of her service is a matter of concern to the dental profession, which shall always supervise her activities.

7th. It devolves upon the dental societies to propose appropriate legislation legalizing the dental hygienist in every State in the Union, as all such legislation should originate from the dental profession.

576 FIFTH AVE.

[See also *Discussion*, as reported under "Proceedings of Societies," this issue.]

## New Light on Dental History.

By LAWRENCE PARMLY BROWN, D.D.S., Peekskill, N. Y.

### THE FIRST DENTAL SOCIETY.

IN dental literature of the last quarter century we find a continual repetition of the erroneous statement that the first society in the history of the profession was organized in 1837, and that nothing is now known of its objects, activities and personnel. Indeed the only authentic notice of this society that appears to be known to our historians is found in the *American Journal of Dental Science*,<sup>1</sup> Vol. I, No. 2, p. 17, August 1839, and there we read:

It being the opinion of the Dental Association of Western New York (auxiliary to the Society of Surgeon Dentists of the city of New York) that the *American Journal of Dental Science* is highly calculated to exalt the character and standing of the profession in the United States:—

Therefore, RESOLVED, That we, as a Society, and as individuals, will use our utmost endeavors to further the worthy objects contemplated by the editors and projectors of

said Journal, by procuring subscriptions, and by contributing, as may be in our power, to its pages.

(Signed by eleven members)

Reference is made to the above notice in the "History of Dental and Oral Science in America" (prepared under the direction of the American Academy of Dental Science; S. S. White, Philadelphia, 1876), and in connection with this reference it is stated that "About the year 1837 was instituted in New York City an association of dentists under the title of 'The New York Society of Dental Surgeons.' This body had only a limited existence and there are no records of its doings, objects, or date of beginning or ending" (p. 143; where 1837 is doubtless a typographical error for 1839, the year in which the above notice was published in the *American Journal*; for the writer evidently had no knowledge of the New York Society except as obtained from the *Journal* notice). Guerini takes the 1837 from the "History of Dental and Oral Science," but makes it worse with the unqualified statement that "In 1837 the Society of Dental Surgeons of New York was organized." ("The Historical Development of Dental Art," in DENTAL COSMOS, January 1901, Vol. XLIII, p. 8); and Koch, in his "History of Dental Surgery" (Chicago, 1909), puts Guerini's error in still more definite form, stating that "Prior to 1837 there was no dental society in the United States . . . . In 1837, an association of dentists was formed in New York City, of which, however, no records are in evidence. Who were the men that formed it, what was the object of its formation,

<sup>1</sup> As the dates of the nine issues of Vol. I of the *American Journal* appear only on the front covers, which are not included in the volume as ordinarily bound, while unbound copies in original covers are very scarce, these dates may be of service to writers on dental history. They are: No. 1, June; No. 2, August; No. 3, September; No. 4, December 1839; No. 5, May; No. 6, July 1840; Nos. 7 and 8 in one issue, August and September 1840; Nos. 9 and 10 in one, January and February; Nos. 11 and 12 in one, August and September 1841. No. 1 of Vol. II is also dated September 1841; and No. 2 of Vol. I begins anew with page 1, after which the pages are numbered consecutively to the end of the volume.



or when it ceased to exist are matters not now known. It was followed by the Dental Association of Western New York, which also left no records of its work" (Vol. II, pp. 857, 859). The associations here mentioned are the only two of which we have any evidence until the organization of the American Society of Dental Surgeons in 1840; but nevertheless Simon states in his "History of the Baltimore College of Dental Surgery" that "several" short-lived local societies preceded the American Society (in *Transactions Fourth International Dental Congress*, Vol. III, p. 294, and pamphlet, p. 7), and this erroneous statement is repeated in Koch's "History of Dental Surgery" (Vol. I, p. 326).

The assumption that the American Society was preceded by "several" others (of course more than two) was perhaps the result of misunderstanding two variant references in the *American Journal* to the original New York Society (Vol. I, pp. 221, 223). The Baltimore editor (Chapin A. Harris) there discusses an open letter published by J. W. Crane in some of the New York newspapers, in which an attack was made upon Eleazar Parmly and others in New York. In the course of his discussion, Harris says:

After this, he [Crane] boasts of having given lectures to the New York Dentists' Society, "and giving them"—we suppose he means its members, though he speaks only of the Society—"many new patterns of instruments," &c. &c. Again, with the greatest self-gratulation, he says: "They," referring to the Society, "have also taken patterns of my operating chair, which I INVENTED about ten years since . . ."

If there are those who wish to know Dr P's [Parmly's] views on this subject [of professional qualifications], we would refer them to his chapter on the qualifications of the dentist, published in his treatise about twenty years ago ["An Essay on the Disorders and Treatment of the Teeth"; London 1821; New York 1822]; and also to his lecture, delivered before the Society of Dentists, in New York, on the same subject, published in the 19th number of the *United States Medical and Surgical Journal*. . . .

Evidently none of our historians has turned to the scarce medical periodical here mentioned, for it gives us considerable information regarding the first dental society, as follows:

The Society of Surgeon-Dentists of the City and State of New York. This is the style and title of a new Society, which, we are happy to state, has recently been organized in this city, and which, from the number and respectability of its members, gives fair promise of much future usefulness.

The objects of this Society are for mutual improvement, by an interchange of ideas, and communication of facts, together with an effort to elevate the character, and increase the usefulness of the dental profession; and we have reason to believe that such a Society, judiciously conducted, will not fail to impress the public mind with a greater feeling of confidence than heretofore, in the value of this highly important and useful branch. . . . [With more to the same effect, and much gratuitous advice for the conduct of the Society.]

The following is a list of the officers: *President*, E. Parmly; *Vice-President*, E. Baker; *Corresponding Secretary*, S. Brown; *Recording Secretary*, E. Bryan; *Treasurer*, J. Lovejoy; *Librarian*, J. W. Crane.

(*U. S. Med. and Surg. Journal*, Vol. I, p. 157; No. 4, November 1834.)<sup>2</sup>

TO THE PUBLIC: A number of dentists of this city have associated themselves together and formed a society, known as "*The Society of Surgeon Dentists of the City and State of New York*." The primary objects of which are mutual improvement, a desire to extend the usefulness of those who may become members, to encourage all improvements in dental surgery, whether partial or general, by whomsoever offered, and finally, to promote the respectability of the profession, by putting down, if possible, all imposition and unprincipled quackery, by which the public and profession at large are made to suffer. . . . [Followed by a heated denunciation of Royal

<sup>2</sup>It appears that this number of the *U. S. Med. and Surg. Journal* was issued a month or so later than it is dated, for we shall find that the original New York Society was organized on the first Wednesday of December 1834. Only twenty-eight monthly numbers of this scarce medical periodical were published, from August 1834 to November 1836.



Mineral Succedaneum, the name given to amalgam by the Crawcours.]

By order of the Society,

ELEAZAR PARMLY, *President*,  
E. BRYAN, *Secretary*.

New York, 11th February 1835.

(*U. S. Med. and Surg. Journal*, Vol. I, pp 311, 312; No. 8, March 1835.)

Another early notice of this Society appears in the *New York Mirror* for March 14, 1835 (Vol. XII, p. 295), and is in part as follows:

*Dentistry.* We have been particularly gratified in looking over a pamphlet which came to our hands, accidentally, a day or two since, containing the constitution and by-laws of the Society of Surgeon Dentists of the City and State of New York. . . . We have often been struck with admiration at the vast increase in the number of dentists practicing in this city within the last few years; we can remember, and that not very long ago, when there were but six or eight, and at present, we are informed that the list is swelled to eighty. . . . The object of the society is to exalt the character and usefulness of the profession, by the same means that are deemed essential in those of medicine and surgery. Hitherto there has been no restriction upon the practice; any person who can possess himself of a key and a few scrapers is at liberty to do what seems good to him with the ivories of all who have courage enough to intrust themselves in his hands. The constitution of the society aims directly at this evil, by providing for the examination of applicants, and preventing, so far as can be done by moral influence, the intrusion of unqualified pretenders. The formation of a lyceum and library, and the institution of lectures, are also prominent objects; and as all the respectable dentists in the city have enrolled themselves as members, we have every reason to hope that a decided improvement will soon be effected in the state of dental theory and practice.

Returning to the *New York Medical and Surgical Journal*, we find:

Analysis of Papers read before the Society of Surgeon Dentists of the City and State of New York [on the first Wednesday of December 1835. See below].

1. The object of the Society; qualifications, etc., necessary to become a good Surgeon

Dentist. By E. Parmly, President of the Society.<sup>3</sup>

—It has been my wish for several years past, to assist in organizing a society in this city, composed of respectable and well instructed dentists, for the purpose of giving greater respectability and more extensive usefulness to our profession. . . .

2. Anniversary Address by E. Baker, Esq., Vice-President of the Society, Extracts from:

— . . . Our present society was formed on this day, one year past [December 3—the first Wednesday in December, 1834]. . . .

Our society will have it in their power, when possessed of funds sufficient for the purpose, to reward the exertions of the industrious and enterprising, with premiums or honorary medals. . . .

3. An Address on Anatomy, Physiology, &c, By J. W. Crane, M.D. This is an interesting paper on the subject of which it treats.

4. An Analysis of a Paper read before the Society, by J. B. Stout, M.D., Lecturer on Physiology. . . .

A paper read before the Society, on the several important operations in Dental Surgery, by E. Parmly, President of the Society.

(Vol. II, pp. 254–259; 330–337; Vol. III, pp. 82–87—Nos. 19, 21 and 27; February, April and October, 1836.)

Next in chronological order comes a copy of the *Transactions* of the Society, containing its Constitution and By-Laws; names of officers and members for 1836, and Analysis of Papers “As published in the *U. S. Med. and Surg. Jour.*, February 1836 [and later in same year]”. Here we doubtless have a second edition of the Constitution and By-Laws; for the text shows that the officers for 1836 were elected at the anniversary meeting held on the first Wednesday in December, 1835, while the *Mirror* notice of March 14, 1835, must refer to a first edition issued between that date and December 3, 1834, when the first meeting was held. In the extant (second) edition (16 pages, without cover) we find the following:

<sup>3</sup>This is the address to which reference is made in the *American Journal* as above cited.

TRANSACTIONS  
OF THE  
SOCIETY OF SURGEON DENTISTS  
OF THE  
CITY AND STATE OF NEW YORK.

Established, 1834.

CONSTITUTION AND BY-LAWS.

PREAMBLE.

Whereas, the practice of Dental Surgery in this City, and the United States generally, has been hitherto conducted by private and individual enterprise, without any public legislative regulation or systematic co-operation on the part of the practitioners of the art, and . . .

RESOLVED, That we will associate together for the purpose of improving the character and increasing the usefulness of our profession; and for the accomplishment of these objects, we will petition the legislature of the State of New York for a charter, conferring the privilege of holding real estate and personal estate as a corporate body, to an amount not exceeding twenty-five thousand dollars; of instituting a Dental Library and Lyceum in the City of New York; of granting diplomas, and of doing and performing such other acts as may be expressed in said charter. . . .

CONSTITUTION.

ARTICLE I. This Society shall be known by the name of "The Society of Surgeon Dentists of the City and State of New York."

ARTICLE II. The officers of the Society shall be the President, Vice-President, Recording Secretary, Corresponding Secretary, Treasurer, Librarian, and a committee of three, to be denominated *The Investigating Committee*. Each of the said officers shall be chosen annually.

BY-LAWS.

ARTICLE I.

Of the Admission of Members.

*Section 1.* Every candidate for membership shall be nominated at a regular meeting by one, and seconded by another member. The Investigating Committee shall afterward examine into the professional qualifications and moral character of every such candidate, and make their report accordingly at the next

regular meeting; after the reading of which, with any accompanying documents, the Society shall proceed forthwith to ballot for the said candidate; and if three-fourths of the members then present shall vote for his admission he shall be declared duly elected; and shall be accordingly admitted to membership, upon paying to the Treasurer the initiation fee of twenty-five dollars.

*Sec. 2.* Any suitable person, not resident in this city, may be elected an Honorary Member, in the same manner as the regular members, and shall be entitled to all their privileges, excepting the right of voting and acting in an official capacity.

ARTICLE II.

Of the Election of Officers.

*Section 1.* The election of officers shall be by ballot, and shall be determined by a plurality of votes.

*Sec. 2.* The election of officers shall take place on every anniversary of the Society.

ARTICLE III.

Of the Duty of Officers.

*Section 1.* It shall be the duty of the President to preside at all meetings of the Society, . . .

*Sec. 3.* It shall be the duty of the Recording Secretary to record the proceedings of the Society in a book provided for the purpose. . . .

*Sec. 6.* It shall be the duty of the Treasurer to receive all moneys due to the Society, and to pay out the same to the order of the President, . . . and to make a semi-annual report of the state of the finances at the regular meetings in June and December of every year, or oftener, if required by the Society.

*Sec. 7.* It shall be the duty of the Librarian to arrange and take charge of the Library and Lyceum, to make a catalogue of all books, instruments, specimens or other articles received, and to keep a strict account of all books lent out to any member, . . .

*Sec. 8.* It shall be the duty of the Investigating Committee to examine into the moral character and professional standing or qualifications of each candidate for admission to membership. They shall also require of the candidate satisfactory evidence that he has enjoyed a suitable opportunity, under a competent dentist, of acquiring a good knowledge of the surgical and mechanical branches of the profession. They shall be required to question him thoroughly touching his mode



of practice in the different branches of the profession, and use such other means as they may deem advisable or necessary to satisfy themselves as to his proficiency in the art, or capability of practicing the same. . . .

*Sec. 9.* It shall be the duty of the Committee to investigate any charge of malpractice or improper conduct, alleged by any one member against another; provided such charge be made in writing, and be signed by the complainant, and shall not appear to them to be of a frivolous or vexatious nature. . . . a fair, full and impartial investigation shall take place; . . . the Society . . . shall deal with the offending member in such manner as the circumstances of the case may seem to require. . . .

#### ARTICLE IV.

##### Of the Meetings of the Society.

*Section 1.* The regular meetings of the Society shall be held at such place as the Society shall from time to time determine, on the first Wednesday of every month, or oftener, if deemed necessary, by adjournment.

*Sec. 4.* The Anniversary of the Society shall take place on the first Wednesday of December, and shall be annually celebrated by the reading of the reports of the officers of the Society, the delivery of an address by some one of the members, suitable to the occasion, and by such other means as the Society shall determine. The annual election of officers shall also take place on this day.

#### ARTICLE V.

##### Of the Objects of the Society.

*Section 1.* It shall be the privilege of any member of the Society to consult and advise with any other member in relation to his professional pursuits.

*Sec. 3.* In order more effectually to promote the honor of the profession, as well as to preserve good feeling and harmony among its members, it shall not be deemed honorable for any member, by means of advertisements, handbills, circulars, or in conversation with his patrons, to claim to be the *exclusive* manufacturer or possessor of good incorruptible or other teeth; or to claim any *superiority* over any other member, either as to his mode of performing any operation, in the quality or kind of teeth, or other material or instrument used by him.

*Sec. 4.* It shall be an object of the Society to publish, from time to time, in books, pamphlets, lectures or periodical papers, the general doctrines of Dental Surgery, in order to

enlighten the public mind on the subject of the management of the teeth, their disorders and remedies. The Society may also occasionally offer premiums for the best essays for improvements in instruments, or other matters appertaining to the Art, which shall tend to render it more useful and perfect.

#### ARTICLE VI.

##### Of Fines.

*Section 1.* Every member absent from the regular or adjourned meetings an hour after the hour appointed, shall be fined fifty cents; if absent the whole of the evening, he shall be fined one dollar; to be remitted only in case of sickness, or absence from the city.

*Sec. 2.* Neglect or failure to present an Essay or Dissertation on some subject connected with the profession, when appointed to that office by the Society, not oftener than once a year, shall incur the penalty of five dollars.

#### ARTICLE VII.

##### Expulsion of Members.

*Section 1.* Any member may be expelled from the Society at any regular meeting, but at no other time, for misconduct in his profession, or for moral delinquency in his private character, by the concurring votes of at least three-fourths of the members then present.

#### ARTICLE VIII.

##### Of Membership.

*Section 1.* No individual shall be fully recognized a regular member of this Society, until his name shall be signed by his own hand, or by his consent in writing, to the Constitution and By-Laws; nor as an honorary member, until he shall have accepted of that honor, either verbally or by writing.

E. BRYAN, *Secretary.* E. BAKER, *Chairman.*

Eleazar Parmly,	Clark Greenwood,
John Lovejoy,	J. Smith Dodge,
J. W. Crane,	Augustus Gaetan,
Lucius Redington,	Isaac J. Greenwood,
John Burdell,	E. Gale Burger,
J. Parmly,	S. Avery,
Solyman Brown,	Vernon Cuyler. <sup>4</sup>

<sup>4</sup>These are the sixteen members of the Society in 1836, who signed the Constitution and By-Laws in accordance with Art. VIII, Sec. 1 of By-Laws. The officers for 1836 were elected on the first Wednesday in December 1835 (see Art. IV, Sec. 4).



Officers of the Society for 1836.

E. Parmly, *President*.  
 E. Baker, *Vice-President*.  
 E. Bryan, *Recording Secretary*.  
 S. Brown, *Corresponding Secretary*.  
 J. Lovejoy, *Treasurer*.  
 J. W. Crane, *Librarian*.  
 E. Parmly,  
 E. Baker,  
 J. W. Crane, } *Investigating Committee*.

The following notice of the same Society appears in the first edition of Shearjashub Spooner's "Guide to Sound Teeth" (N. Y., 1836; p. 112):

The few well educated members of our profession, in New York, have been using their best endeavors to elevate it to its proper rank and usefulness. For this purpose a "*Society of Surgeon Dentists*" has been formed, for the honorable and laudable purpose of mutual improvement.

The Society has organized itself, a library is being established, and a course of lectures on the subject of the profession is annually to be delivered.

It is also the intention of the Society to petition the State Legislature as soon as proper, for the passage of a law, to put down quackery, by making it necessary for those who would practice dental surgery, to thoroughly understand the profession, and to pass a regular examination before a competent board of surgeon dentists<sup>5</sup>; also for a charter

<sup>5</sup> The examining board to which Spooner refers was of course to be a licensing board, which explains what is meant by "granting diplomas [licenses]" in the Preamble to the Constitution and By-Laws as given above (see also the *Mirror* notice). As early as 1798 the Assembly of the State of Maryland created an examining board to license dentists as well as physicians, and Horace H. Hayden was licensed by it to practice dentistry in 1800.

That Spooner's notice is overlooked by our historians as above cited is the more remarkable because we find a reference to it, with some misquotations, in Elbridge Bacon's "Historical Address to the Maine Dental Society," published in the *DENTAL COSMOS* for November 1891 (Vol. XXXIII, pp. 987, 988). Bacon says of the organizers of the original New York Society: "I presume their good intentions were not realized, as I have not been able to find any account of their transactions. or that the society had any further existence."

to found an institution for qualifying students to practice dentistry. Which measures, if adopted and put into execution, will prove of incalculable advantage to the community.

Additional evidence relative to the original New York Society is in possession of the present writer, in the form of some recollections of John B. Rich, incorporated by him in an off-hand "Statement on the History of American Dentistry" which he dictated to a stenographer for E. Parmly Brown, the writer's father, Rich then being 95 years old. In his Statement, appended to this article, he says:

I started practice the 20th of March, 1836. Two Nelson Brothers, twins, Albany. Concerted action for elevating the profession. Meeting at your father's house, opposite Niblo's [i.e., at the house of E. Parmly Brown's father, Solyman Brown]. 25 or 30 dentists present,—meeting did not amount to anything.<sup>6</sup> Your father [Solyman Brown] was always very enthusiastic. At this meeting your father was elected President, I was Secretary. [We] Called on every dentist in New York to get his opinion on organization. "If we elevate all these men you say know nothing, we are elevating ourselves" [evidently the gist of their argument]. The profession was not one to be proud of in those days. Of the sixty-nine [dentists in New

And he assumes, erroneously, that this was not the association to which the *American Journal* refers in 1839; for he adds that "The next society was the New York Society of Dental Surgeons, that held its meetings in New York City, it is supposed about 1837."

A far worse error than any of those already noticed is found in Truman W. Brophy's article on the "Progress of Dentistry in America," in Vol. VII of "The Making of America" (1906), where he states that the American Society of Dental Surgeons was the first of the kind (p. 440). As "The Making of America" has become quite a popular reference work, it is unfortunate that dentistry is not represented therein by something better than Brophy's article.

<sup>6</sup> With twenty-five or thirty members present at this meeting, it is hardly possible that it literally "did not amount to anything." Rich was probably measuring his more or less vague recollection of it by the standards of the great conventions of his later years.

York City] some were barbers, cuppers, leechers and toothdrawers.

If Rich started practice with the Albany Nelsons (Alexander and Robert) in 1836, he doubtless removed shortly to New York City, where he started in that year, according to his obituaries in the *N. Y. Herald* (August 13, 1910) and the *DENTAL COSMOS* (October 1910); and further on in his Statement he tells us that when he returned to this country, after spending his early years abroad, he formed a partnership with a Dr. Fogg of New York City for one year, going to John Street six or seven years later, in 1842. And he adds that "Fogg was bitterly opposed to my belonging to the society"—evidently the original society, for Rich was not a member of the American Society during its first few years, as is proved by its membership lists in the *American Journal*.<sup>7</sup> Obviously he refers to one of the anniversary meetings of the original Society, when elections were held; and if his recollections of the meeting place be correct, the meeting to which he refers was that of December, 1838, for Solyman Brown resided and practiced at 571 Broadway from May 1, 1838 to May 1, 1839—the dedication to his "Dental Hygeia" being dated at that address, "opposite Niblo's Garden," May 1838. Thus it appears that Solyman Brown was President and John B. Rich one of the Secretaries, for 1839, the year in which the *American Journal* refers to the Society, as cited above; and as Eleazar Parmly served as President for 1835 and 1836, it is entirely probable that Elisha Baker, his Vice-President, succeeded him as President and served for 1837, perhaps being succeeded by Elijah Bryan for 1838.<sup>8</sup>

<sup>7</sup> "John B. Rich, dentist," first appears in the New York City Directory in the issue of 1841-2, with his address at "38 or 54 John St." No such name as Fogg for a dentist is found in the directories of this period, nor is there anything otherwise in evidence concerning the man of whom Rich speaks.

<sup>8</sup> But it is possible that Bryan was never President of the Society. He was a spiri-

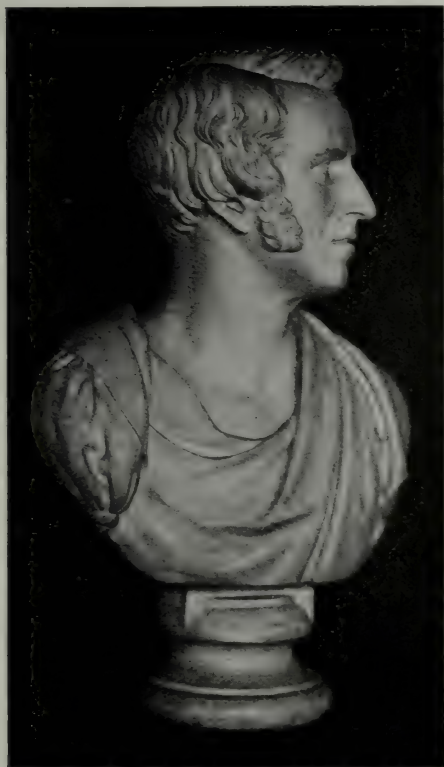
We thus have a large amount of information regarding the objects, activities and personnel of the world's first dental society, together with the dates of its organization (December 3, 1834) and anniversary meetings from 1835 to 1838. There can be little or no doubt that it continued in successful existence until the organization of the American Society in August, 1840, and was a State as well as a City organization in fact as in name: otherwise the Dental Association of Western New York would not have been auxiliary to it in 1839, and perhaps earlier. Indeed the American Society, covering the broader field of the whole nation, appears to have succeeded the New York Society as its child and heir; the principal objects and projects of both being essentially identical (cf. *American Journal*, Vol. I, p. 157 *et seq.*). Nevertheless it is quite probable that the original society ceased to continue as a separate and local organization because of personal animosities among its members; opposing factions being led by Eleazar Parmly and J. W. Crane, between whom there was bad blood in the latter days of the original society, as we saw above. Thus, after his attack on Parmly and others in New York, Crane complained "that many of those who had continued friendly to him 'were [in his own words]

tualist, and had a widowed sister, a medium, whom he took to the houses of brother dentists for private seances. (This is from the recollections of a member of Solyman Brown's family.) From his newspaper ads. around 1830-33 we learn that "Mr. Bryan, Surgeon Dentist," was formerly of London and that he practiced in New York at 21 Warren St. He announces that he "has now ready for inspection a beautiful assortment of *Viller's newly invented Porcelain and Terra-Metallic Incorruptible Teeth* . . . and reserves to himself the exclusive use (in this city) of his patent Perpendicular Tooth Extractor, now brought to great perfection." Henry Villers, M.D., in his ads. of a later date, announces himself as "States Dental Surgeon, &c., &c., &c. Sole inventor of the most approved compositions for making the various kinds of *Siliceous Vitriscent Incorruptible Mineral Teeth, Enamels, Colors, &c.*"



not considered worthy of an invitation to the late Dental convention'—himself 'sharing in the exclusion'" (Chapin A. Harris in *Am. Jour.*, Vol. I, p. 220, where the reference is to the first con-

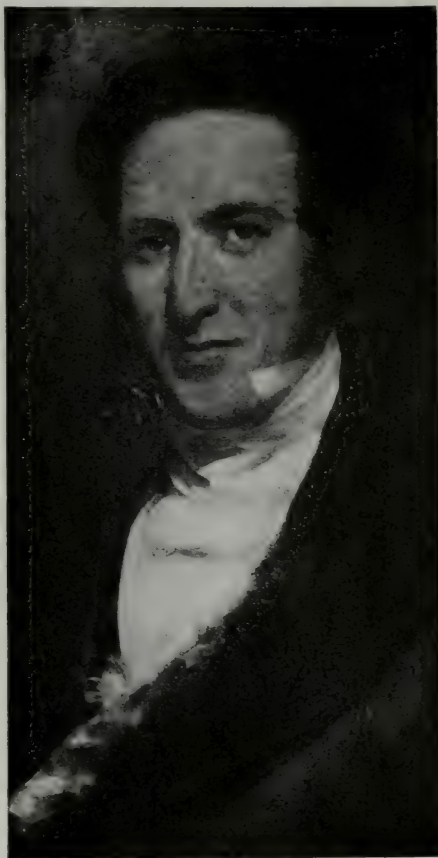
ing Committee), Isaac I. Greenwood and Vernon Cuyler (see *Am. Journ.*, Vol. I, pp. 167, 168 and 157).<sup>9</sup>



ELEAZAR PARMLY.

Portrait bust in marble by Solyman Brown.  
(About 1835.)

(This is the bust that inspired Norman W. Kingsley's first efforts in sculpture. See Koch's "History of Dental Surgery," Vol. III, p. 550.)



ELEAZAR PARMLY.

Portrait in oil by Solyman Brown, in possession of the Parmly family.

(About 1840.)

vention of the American Society). And thus, too, only half the members who signed the Constitution and By-Laws of the New York Society in December 1835, are found among the organizers of the American Society in 1840; *viz.*, Eleazar Parmly (as Second Vice-President), Solyman Brown (as Recording Secretary), Elisha Baker (as Treasurer), Jahial Parmly (on Executive Committee), J. Smith Dodge (on Examining Committee), John Lovejoy (on Publish-

#### THE FIRST DENTAL JOURNAL.

The first number of the first dental periodical—the *American Journal of*

<sup>9</sup> We have Thorpe's Biographies of Eleazar Parmly and Solyman Brown in Koch's "History of Dental Surgery" (Vol. III) and previously in *Dental Review* (Vol. XVI, Nos. 10 and 12); but they are far from complete and contain some errors. Of Elisha Baker, M.D., there is a short obituary notice in the *DENTAL COSMOS*, Vol. XIV, p. 273, where we learn



*Dental Science*—is dated June, 1839, about a year before the organization of the American Society; while no such publication appears to have been among

practically nothing of him, except that he died March 9, 1872. The third meeting of the first convention of the American Society was held at his residence, 6 Warren St., New York City (*Am. Journ.*, Vol. I, p. 164).

The New York Jahial Parmly was a cousin of Eleazar; studied dentistry with the latter and was associated with him from 1829 to 1839. This Jahial is generally confused with Eleazar's brother Jahial, also a dentist, of Savannah, Ga., and itinerant in the South. Eleazar Parmly had three brothers, a son, five nephews, two brothers-in-law and two brothers of a sister-in-law who were dentists, several of them among the most eminent in the profession. It is doubtless the greatest dental family in history, with Eleazar the leading figure although younger than his brother Levi S., with whom he studied dentistry. Eleazar in turn instructed several members of the family, who were successively associated with him; but the only person outside of the family who received his instruction was Solyman Brown, in 1832. (E. J. Dunning, who was assistant to Eleazar Parmly from 1844 to 1856, had previously practiced in Ithaca, N. Y.)

Solyman Brown became associated with Eleazar Parmly in 1833, as mechanical assistant; practiced in 1834 in partnership with Samuel Avery (one of the members of the original New York Society who signed the Constitution and By-Laws as quoted above); took his brother Augustus W. Brown as a student in 1838, and as a partner from 1839 to 1844, in the latter year selling out to the said A. W. Brown and Chas. C. Allen. Solyman Brown next practiced in Ithaca in partnership with Chas. S. Miles; in 1850 opened a dental depot in New York City, where he also practiced for nine months (1852-3) with Norman W. Kingsley and Samuel Lockwood, Jr., as partners, and from 1854 to 1862 conducted the New York Teeth Mfg. Co., with Chas. S. Miles, John M. Crowell, William H. Dwinelle and others. During all this time he was also engaged in literary work and preaching in Swedenborgian churches; having previously been a teacher and Congregational preacher in his native town of Litchfield, Conn. The only published account of his eventful early life is to be found in the present writer's Introduction and Notes to "Elizabeth of Litchfield; an Historic Novel of the

the projects of the first society. But John B. Rich says in his Statement to E. Parmly Brown:

About that time (1836) we tried to establish a journal with your father [Solyman Brown] as editor. Dr. [Eleazar] Parmly, Dr. [Elisha] Baker, your father and I raised enough money to get out a few copies of the first number of the [American] Journal [1839]. We managed to get out 12 numbers in about 18 months; the second volume two years afterward [whereas the issues of Vol. I are dated from June, 1839 to August and September, 1841; while Vol. II runs from September 1841 to June, 1842, in quarterlies].

A more circumstantial account of the origin of the first journal, which appears to be unknown to our historians, is given by Solyman Brown in an article on "Early History of Dental Surgery and Mechanics in the United States," published in the scarce *Dental Science and Art Journal*, February 1875 (the only number issued), when the author was 85 years old. In this article he says (p. 5):

The first organized attempt to elevate dentistry from an art to a science, by means of a periodical, was made in the year 1840 [a slip of the memory, the author doubtless having the date of the organization of the American Society in mind]. In the autumn of that year [another slip, as it was probably in May, 1839—see below], Dr. Chapin A. Harris, of Baltimore, an eminent practitioner of dentistry, and educated physician and surgeon, visited the city of New York to consult with some of his professional brethren on the subject, which [later] occupied much of his attention and engrossed a large share of his professional affection. He invited Dr. [Horace H.] Hayden, of Baltimore, to accompany him to the commercial capital of the nation, and assist him in his enterprise; but Dr. Hayden declined to comply, alleging that he had labored too hard and too long in the ac-

American Revolution," by the Rev. Solyman Brown, A.M., M.D., D.D.S., published as a serial in the *Litchfield Enquirer*, 1917-18.

John M. Crowell eloped with William H. Atkinson's only daughter, Frank, when he was old enough to have been her father, and there was never a madder man than "Father Atkinson." The story of this episode, which is ignored by our biographers, would make interesting reading.

quisition of professional knowledge to sow it broadcast through the land by means of a magazine.<sup>10</sup> Whereupon Dr. Harris visited New York alone, and invited Dr. Eleazar Parmly, Dr. E. Baker, and a few others, including the writer, to meet him at some suitable place, to discuss the business of his errand to the North. The writer's house in Park Place [No. 17, where he resided and practiced from May 1, 1839 to May 1, 1840] was appointed as the place of meeting, which was held on the following day and evening. Late in the afternoon Dr. Hayden arrived and joined in the discussion, still expressing himself as opposed to the movement of publishing professional knowledge to the world. Nevertheless, in spite of this individual objection, the meeting resolved on the publication of a Dental Journal forthwith, whereupon Dr. E. Parmly, Dr. E. Baker and Dr. S. Brown were made Publishing Committee [as they appear in the first volume, 1839-41, published in New York City] to bring out the work in monthly numbers. The Committee appointed the writer to act as practical Editor of the first volume, consisting of twelve numbers octavo [but Harris and Eleazar Parmly were the nominal editors of the first volume].<sup>11</sup> In order to place the work on solid foundations it was resolved to furnish the numbers of the first volume at the rate of \$2.50 instead of \$3.00, the subscription price, to all subscribers who would pay one hundred dollars in advance, which would entitle each subscriber to forty copies. To these terms several individuals promptly conceded, among whom were Dr. E. Parmly, John Burdell,<sup>12</sup> A. W.

Brown,<sup>13</sup> and some others, enabling the publishers to make favorable terms with the printer.<sup>14</sup>

quoted, but did not join the American Society. He was a brother of Harvey Burdell, also a dentist, whose murder in Bond St. was the sensation of the day.

<sup>13</sup> Augustus Woodruff Brown was born in Litchfield, Conn., in 1805, and in 1838 came to New York City where he studied and practiced dentistry with his brother Solyman, as stated in Note 9. In 1840 he signed the original Constitution of the American Society; the first regular meeting of that organization being held at "the residence of Messrs. S. and A. W. Brown, No. 13 Park Place," following the preliminary meeting at the American Hotel the day before (*Am. Journ.*, Vol. I, pp. 157, 158). Being one of the earliest advocates of amalgam, his connection with the Society was severed in 1845, near the beginning of the "Amalgam War," and thenceforth he used the material extensively and profitably in his large and fashionable practice. In 1853 he purchased a fine house at 3 Great Jones St., where he resided and practiced till 1885; retiring in that year to his country place in Manchester, Vt., where he died in 1895, in his 90th year, possessed of considerable wealth. He married in 1844, and had nine children; but was survived by only two daughters. Among the several whom he instructed in dentistry, the last was his nephew, E. Parmly Brown, in 1865-6, just after the latter was mustered out of the Union Army, and more than ten years after Solyman, E. Parmly Brown's father, had finally retired from dentistry, going into the New York Teeth Mfg. Co.

<sup>10</sup> Compare the early liberal view of Koecher, who says in 1826 that "as soon as the respectable professors [*i.e.*, practitioners] of this art shall begin to communicate more fully to each other, and to the world, the fruits of their experience, it will prove that this business is capable of systematic arrangement." ("Principles of Dental Surgery," Chap. I.)

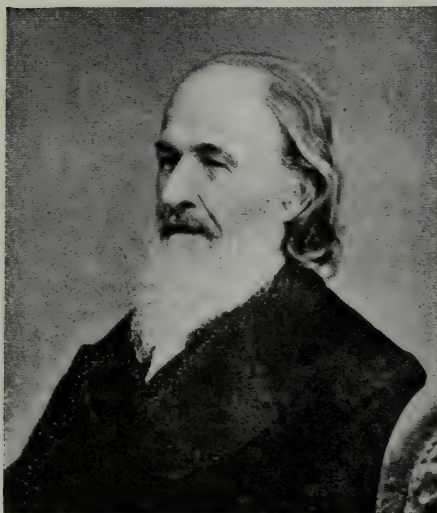
<sup>11</sup> Parmly contributed practically nothing; the Harris editorials are signed "Balto. ed.," while the remainder, unsigned, are from the pen of Solyman Brown, who also has nine signed articles in this volume, besides his report as Secretary of the first convention of the American Society, and a reprint of his "Dentologia," with Notes by Eleazar Parmly, as originally published in 1833.

<sup>12</sup> John Burdell was one of the members of the original New York Society who signed the Constitution and By-Laws as above

<sup>14</sup> In the list of those who took twenty or more copies, in the *American Journal*, Vol. I, pp. 94-96, only Eleazar Parmly and Chapin A. Harris took forty; others, including John Burdell and A. W. Brown, taking twenty each, doubtless for \$50. We evidently have the same list, with additions (including Isaac I. Greenwood, with forty copies), in the *Journal* for Jan. and Feb. 1841, at the end of the Appendix (Parmly's Notes) to "Dentologia," pp. 102-104, where it is stated that "The republication of the following Poem and Notes, as a part of the successive numbers of the *American Journal of Dental Science*, for the years 1840-41, was sustained by the following catalogue of subscribers:" (aggregating 339 names and 794 copies). It therefore appears that those who subscribed for extra copies of the Journal did so for the sake of the poem, which some rebound in



As soon as the first number was issued, proposing the terms of publication to the profession, subscriptions came in, as well from America as across the Atlantic, until the publishers were obliged to apply to the large subscribers



SOLYMAN BROWN, A.M., M.D., D.D.S.  
(1871.)

[for extra copies] to enable them to meet the demand. Dr. E. Gidney,<sup>15</sup> of Manchester,

separate form, "Dentologia" thus being largely instrumental in the early financial success of the *Journal*, without which it probably would have proved short-lived. The poem was again republished in Stockton's *Dental Intelligencer*, Vol. I (1843-4), and still again in Solyman Brown's *Semi-Annual Dental Expositor* for May 1852.

<sup>15</sup> Eleazar Gidney went to England in 1831, having previously practiced at 26 Park Place, New York City. He was elected an honorary member of the American Society at its first convention in 1840, and later loaned his fine dental library to the Society (*Am. Journ.*, Vol. IV, p. 15; a catalogue of the books appearing *ibid.*, p. 23). A biographical sketch of Dr. Gidney, with a portrait, appears in the prospectus of a volume of "Biographies of Distinguished Dentists and Dental Manufacturers" projected by Solyman Brown; said prospectus being published in *Brown's Quarterly Dental Expositor*, Second Series, July 1859. The volume of Biographies was also to include a Dental Directory, the project thus being the first in both the Biography and

England, actually visited many dentists in the British Isles, to secure their co-operation, and dentists on the continent of Europe manifested an equal interest in the success of the work. In consequence of this signal success of *The American Journal of Dental Science*, it was resolved, at the end of the first volume, to change its form to that of a Quarterly, and transfer the seat of its publication to Baltimore, under the Editorship of Dr. Chapin A. Harris, superintended by the old Publishing Committee. [The last clause is not corroborated anywhere in the *Journal*, where we learn that it was transferred by "the original proprietors" to the American Society upon the completion of the first volume, and that Solyman Brown replaced Eleazar Parmly as New York Editor; but Solyman Brown himself apparently considered that Harris then became the practical editor, as doubtless he was from thence on until his death in 1860, publishing the *Journal* in Baltimore].

Thus it appears that Thorpe is entirely correct when he says in his biography of Solyman Brown that "He and Chapin A. Harris were the principal promoters of the *American Journal of Dental Science*" (in *Dental Review*, Vol. XVI, p. 1070, and Koch's "History of Dental Surgery," Vol. III, p. 93). That Hayden was at first if not always opposed to the *Journal* is evident from the fact that he never appears as one of its editors or conductors. This is noticed by Simon in his "History of the Baltimore College of Dental Surgery," where he adds quite gratuitously of Hayden: "yet he was instrumental in organizing the journal" (in *Transactions Fourth International Dental Congress*, Vol. III, p. 295; pamphlet, p. 7); a statement that is repeated by Thorpe in his biography of Hayden (in *Dental Review*, Vol. XVI, p. 778, and Koch's "History of Dental Surgery," Vol. III, p. 62). Nevertheless Hayden seems to have been reconciled to the publication without much delay, for he was appointed one of

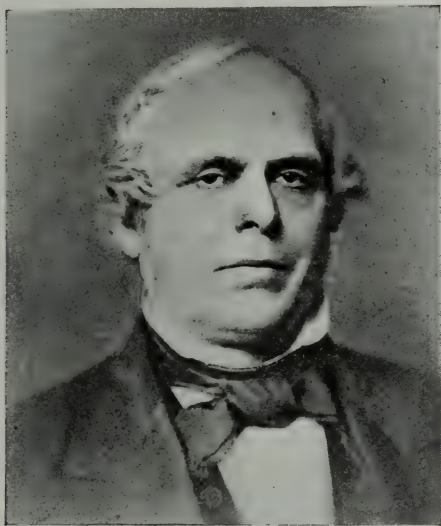
Directory lines; but as 1000 subscribers at \$5.00 each were required before publication, the work never materialized. Harris was ten years earlier with the few meager biographic notices in the first edition of his "Dictionary of Dental Surgery," but these were afterward crowded out.



its "collaborators" at the second meeting of the American Society (*Am. Journ.*, Vol. II, p. 135), and made some contributions to its pages.

#### THE FIRST DENTAL COLLEGE.

An independent and chartered college was one of the projects of the first society in 1836, as we saw above; and the Baltimore College, the first to materialize, was chartered by the Legislature of



CHAPIN A. HARRIS, A.M., M.D., D.D.S.

(About 1860.)

(From an hitherto unpublished photograph.)

Maryland, February 1, 1840, its first session belonging to the following winter, 1840-41 (see Simon, "History of the Baltimore College of Dental Surgery," pamphlet, pp. 12, 13).<sup>16</sup> In the first edition of his "Dictionary of Dental Surgery" (1849), Harris says in a laudatory biographical sketch of Hayden (*in voc.*) that "he [Hayden] consented, at the solicitation of the author [Harris], in December 1839, to unite with him and others, in a petition to the legisla-

ture of Maryland, to establish a Dental College;" and according to Solyman Brown's recollection, in his article in the *Dental Science and Art Journal* (p. 5), the Baltimore College "was organized by Dr. Chapin A. Harris, of Baltimore, in connection with other eminent physicians and dentists of that day." Thorpe, in his biography of Solyman Brown, says that at a meeting of prominent New York City dentists "Dr. Brown suggested, 'Why not have an independent dental college?' This suggestion was seconded by Dr. Jahial Parmly and Dr. Harris, who [*i.e.*, Harris] returned to Baltimore, and with Doctors Hayden, Bond and Baxley founded the Baltimore College of Dental Surgery" (in *Dental Review*, Vol. XVI, p. 1070, and Koch's "History of Dental Surgery," Vol. III, p. 93). This information was furnished by E. Parmly Brown in some hasty notes on the life of his father, in the original draft of which (and doubtless also in the copy sent to Thorpe) appears the following:

The venerable Dr. J. B. Rich said at the dinner given to him at the completion of his fifty years of practice (which, by the way, was the first of the kind [1886]), that Dr. Solyman Brown was the one who suggested "Why not have an independent Dental College," when the meeting of prominent dentists in New York took place, when Chapin A. Harris was on from Baltimore to get a Chair of Dentistry in one of the medical colleges. The suggestion was seconded by Dr. Jahial Parmly; the cue was taken and Dr. Harris returned to Baltimore and started the Baltimore College of Dental Surgery.<sup>17</sup>

<sup>17</sup> The American Society may have had a college project under consideration at its first convention; for in the *Journal* for January and February 1841, we find the statement that "Whether the Society will organize a college of its own, or merely encourage the formation of several in various sections of the union, remains to be seen" (Vol. I, p. 194). And the *Journal* for June 1842 quotes a communication to the London *Lancet*, of course written some months earlier, in which reference is made to the Baltimore College, with the added statement that "Considerable progress has also been made towards the formation of a similar establishment in New York" (Vol. II, p. 301).

<sup>16</sup> It is erroneously stated on the front covers of the College catalogs that it was "Chartered in 1839," although the seal of the institution appears on the same covers with the correct date, MDCCCXL.

There can be little doubt that when Rich made these remarks he was giving his recollection of the original suggestion for an independent dental college, and in all probability that suggestion came from Solyman Brown at a meeting of the first society in 1836, Harris having located in Baltimore in 1835, according to his biographers.

It seems that the above evidence should forever lay the ghost of the old dispute as to whether Hayden or Harris was the first to conceive the idea of a dental college (see Simon: "History of the Baltimore College of Dental Surgery;" pamphlet, pp. 8-10), and also decide the question as to which of the two originated the Baltimore College. For many years current opinion has credited Hayden with the origination of that institution, and this opinion appears to have possessed the mind of John B. Rich when he dictated the following portion of his Statement to E. Parmly Brown, about twenty years later than he made the after-dinner remarks just quoted:

I was the youngest man [among those] that started the first Dental College. Hayden started the idea.

The reason the college could not be established in New York was that the men whom we appointed as professors would not serve because there was no money in it and they could not spare the time. Your father [Solyman Brown] was [appointed] Emeritus Professor. ["Emeritus" is an obvious error, for] He was willing to serve, but no one else. We gave up the idea for a year or two.<sup>18</sup> If we had the College in Baltimore, a man [Harris] would give his time to it, and become the Dean. [Harris was the Dean of the Baltimore College from the time of its establishment until his death]. The \$1,300

<sup>18</sup> Now and again Rich appears to use the "we" in a very broad sense for the early workers in the concerted movement for the elevation of dentistry; and it is not to be denied that he was sufficiently egotistical, but scarcely more so than some other eminent dentists, such as Wm. H. Atkinson, omniscient, dogmatic, belligerent; N. W. Kingsley, pompous and patronizing, and W. G. A. Bonwill, in his peculiar, hypersensitive way.

for the start was subscribed by thirteen of us in New York—\$100 each (and it was not very easy to get that much at that time, either).

It was ten years before the college paid. Only two students the first term, one Philadelphia man and one Southerner.<sup>19</sup> [E. B.] Gardette opposed to it. . . .<sup>20</sup>

[Eleazar] Parmly tried to get a chair of dentistry in medical college, but did not succeed. . . . Fogg was bitterly opposed to my belonging to the Society; he would not go into the college.

Foremost dentists at that time, [Edward] Hudson in Philadelphia, El [eazar] Parmly here [in New York City], [M. K.] Bridges

<sup>19</sup> Five matriculated for the first session, but only two graduated; viz., Robert Arthur and R. C. Mackall, both of Baltimore. Rich's error in referring to one of them as being from Philadelphia was probably suggested by the fact that Arthur practiced for some years in that city, where he was connected with the Philadelphia and Pennsylvania Colleges. A distinguished dentist, accredited with the discovery of the cohesive property of gold foil, his monument nevertheless has a dark side, inscribed with the history of the havoc wrought by his system of filing separations between the teeth. One of the original matriculants was J. W. Clowes, who received an honorary D.D.S. from the College in 1846, and became the "millionaire dentist" of New York City; chiefly known as an amalgam enthusiast and the originator of an amalgam bridge which he called a "causeway." He was not a millionaire, though possessed of large means; in that respect second only to Stephen A. Main among contemporary New York dentists. The latter's establishment at 666 Fifth Avenue, nearly opposite that of Clowes, was the finest in the city, probably the finest in the world. Like Eleazar Parmly, they married money; while many of our most distinguished dentists who neglected that little detail—Harris, Webb, Atkinson, and others—had nothing to leave to their families when they passed away.

<sup>20</sup> Opposition to the College was presumably based on the conviction that dentistry was a specialty of medicine and that dentists should have the M.D., as did E. B. Gardette and his father, James, both of Philadelphia. E. B. also expressed himself as opposed to the American Society; but not until after its first convention at which he was elected one of the Vice-Presidents without being present (*Am. Journ.*, Vol. II, p. 210).



in Brooklyn, and Pat. Houston [in Texas, afterward New York City]. Each gave \$100 for starting college.

The last sentence is not entirely consistent with what is said about the \$1300 having been subscribed in New York, unless later subscriptions were obtained elsewhere; nor does there appear to be any evidence that the New York men were directly connected with the organization of the Baltimore College except in the financial way mentioned by Rich.

#### THE "DOCTOR OF DENTAL SURGERY" DEGREE.

Simon assumes quite gratuitously that "the degree of 'Doctor of Dental Surgery'" must have originated with either Hayden or Harris, who, he thinks, might have had difficulty themselves in stating positively which of them "created the title" (pamphlet, p. 12). But in all probability Harris found in New York the suggestion for the degree as well as for the college itself; as it is inconceivable that the New York college project could have been under consideration for some three years, or for any length of time, without a definite suggestion for a degree in contradistinction to the M.D.; and there is evidence that some American dentists without the medical degree assumed the title of "Doctor" even before the New York college project was conceived, as will be seen from the following quotations:

Every part of our country is overfurnished with ignorant and pretending persons, who assume to discharge the functions and duties of this [the dental] profession; and having dignified their names with the title of "Doctor" they travel about the country imposing upon the people, . . . .

Nor are these sapients confined to the country; they abound in our large towns also. There are seventy or eighty dentists in New York [City].<sup>21</sup> Out of these Mr. [Eleazar]

<sup>21</sup> There is only one dentist, J. Browne, in the first New York City Directory, 1786, and we saw above that Rich says there were sixty-nine in the city in 1836. According to the *New York Pictorial Directory* for 1853,

Parmly informed me that he thought there were about twenty who understood their profession, and practiced it faithfully. (Spooners, "Guide to Sound Teeth," 1st Ed., 1836, p. 110.)

He who yesterday wielded the blacksmith's hammer with unassuming content, today puts forth a sign, bearing on it in great flaring letters, "Surgeon Dentist," . . . turns up his nose at his "ninth proportion" of an old associate, and "thanks him, if he has occasion to address him, to please remember to call him Doctor." (J. McCabe, in *Am. Journ.*, Vol. I, p. 133, July 1840).

Any dentist who thus assumed the title of Doctor doubtless designated himself "Doctor of Dental Surgery," in accordance with the then current "Dental Surgery" for dentistry as a branch of medicine and surgery; the alternative "Surgical Dentistry" naturally being avoided for obvious reasons, although "Surgeon Dentist" was the dignified term for a dentist long before "Dental Surgeon" became the American designation, as finally fixed by the D.D.S.<sup>22</sup> The fact that "Doctor of Dental Surgery" had suggested itself so naturally, probably having become more or less popular before the Baltimore College was established or conceived, may account for the adoption of the D.D.S., instead of C.D.D. for *Chirurgiæ Dentium Doctor*, the Latin degree conferred by the diploma of the Baltimore College and dental institutions generally. Robert Arthur says in No. 1 of his articles on "Dental Education:—"

edited by Solyman Brown, there were about 250 dentists in the city in that year, and the editor says that "One thousand families, or six thousand inhabitants, are estimated to require the services of one dentist" (p. 137).

<sup>22</sup> We find A. B. Hayden announcing himself as "Dental Surgeon" as early as 1828, in his advertisements in the *Daily National Intelligencer* of Washington. He states that he was "Formerly a pupil of H. H. Hayden, Esq.," adding that "A. B. H. has just received from Baltimore, a supply of H. H. Hayden's celebrated Odontalgie Balsam, a *sovereign* remedy for the toothache. Also, his much approved Dentifrice, for beautifying and *preserving* the teeth."



There is one fact connected with the organization of this school [the Baltimore College of Dental Surgery] known to but few persons. It was not originally contemplated by Dr. Harris [note the absence of Hayden's name] that the degree of D.D.S. should be conferred. He was persuaded to introduce this feature by a friend, the Rev. John N. McJilton, now of New York, from whom, some years after the establishment of the college, I received this information. (In *DENTAL COSMOS*, Vol. XVII, p. 232; May 1875.)

This cannot be construed as meaning that Arthur supposed the Rev. McJilton originated the degree; the fact probably being that Harris was prejudiced against it at first because it was already in use in an unwarranted way. But it attained professional status when it was conferred in New York City, for the first time in

author of an article in the *American Journal* for January and February 1841, (Vol. I, Nos. 9 and 10 in one, p. 198), shortly before the first College commencement; and on Robert Arthur's diploma from the College,<sup>23</sup> dated March 9, 1841, both Horace H. Hayden and Chapin A. Harris sign their names with M.D., D.D.S., whereas Hayden never had any dental degree except that of the Society, while Harris received his only college D.D.S., honorary, from the Philadelphia Dental College in 1854. Ludolph Parmly (cousin of Eleazar) has the D.D.S. in the *Journal* for August and September 1841 (Vol. I, p. 280); while in Vol. II, No. 1 (also dated September 1841) we find Solyman Brown and L. S. Parmly with M.D., D.D.S., whereas the honorary degree of the Baltimore

*Horace H. Hayden M.D., D.D.S.*

*Chapin A. Harris M.D., D.D.S.*

(From Robert Arthur's diploma.)

history, by the American Society of Dental Surgery at its first convention, August 1840, some seven months before the college conferred it at its first commencement, March 9, 1841.

The original By-Laws of the American Society provide that "Each and every acting Member or Fellow of the Society . . . shall be entitled to a Diploma, or Degree of Doctor of Dental Surgery;" and that "Each and every Honorary Member . . . shall receive the Diploma, or Degree of Doctor of Dental Surgery by paying therefor to the Treasurer of the Society, the sum of Ten Dollars" (*Am. Journ.*, Vol. I, p. 165). It was a year before the diploma was issued, as we shall see presently; but there can be no doubt that membership in the Society, at least in its earliest years, automatically conferred the degree regardless of the diploma. Thus the D.D.S., as well as the M.D., is appended to the name of Chapin A. Harris as the

College was not conferred upon Solyman Brown and the two Parmlys until February 18, 1842. This date for the second commencement of the College and the conferring of these and other honorary degrees (the first of the kind) is given in the *American Journal*, Vol. II, p. 261, where the day is correctly specified as Friday; and Solyman Brown's diploma,<sup>24</sup> on which both Hayden and Harris sign with M.D., D.D.S.,

<sup>23</sup> Now in the Thomas W. Evans Dental Museum and Institute at Philadelphia. It is dated "Die Martis Idus VII (March 9), Anno Domini MDCCCXLI"; and is considered the first college dental diploma, on the assumption that delivery to Arthur and Mackall, the graduates of the first year, was in alphabetical order.

<sup>24</sup> In possession of the present writer. Solyman Brown heads the list of Honorary Graduates in the College catalogs; but should come second, with Brewster first, if the directory alphabetical order be followed.

is dated "Die Kal. Martis, Anno Domini MDCCCXLII," where we doubtless have a clerical error for "Die XII Kal [endas] Martis" (February 18th). The year was certainly 1842, but nevertheless the Baltimore College catalogs erroneously assign the first group of Honorary Graduates to 1841, the second group to 1843, and so on, with none to 1842.<sup>25</sup>

The original By-Laws of the American Society provided for the annual examination of applicants, who if successful were "to receive the diploma of the Society conferring the degree of Doctor of Dental Surgery;" but there is no record in evidence of any such applicant having received the degree. The same By-Laws further provide that "It shall be the duty of the President . . . to sign the diplomas conferred on members during his term of office," and the Recording Secretary, among his duties, "shall also keep the seal of the Society, together with the copper-plate from which diplomas, certificates or degrees, are struck . . . and he shall furthermore countersign all diplomas."

At the evening session of the third day of the convention, it was resolved "That Eleazar Parmly, M.D., be appointed as the Agent of the Society, to present a petition to the Legislature of the State of New York, asking for a Charter, with power of conferring the degree of Doctor of Dental Surgery" (*Am. Journ.*, Vol. I, p. 167). In the next issue of the Journal (January and February 1841), the Recording Secretary (Solyman Brown) tells us that "The subject of conferring the degree of [Doctor of] Dental Surgery has engaged the early attention of the Society, and the committee appointed to prepare the Diploma, and its appropriate seal, has already nearly completed its task. Every member of the society, honorary as well as active, will be entitled to a diploma by paying into the treasury a stipulated sum . . . . By the time of the second annual meeting of the Society, in August next, much progress will be made towards bringing the association into regular form, provided the Agent appointed to make application for

<sup>25</sup> As alumni lists are sometimes consulted for historical purposes, the following corrections and additions in connection with the first group of Honorary Graduates in the Baltimore College catalogs may be of value:

(Catalog)  
1841.

(Corrections and additions)  
1842.

- |   |  |
|---|--|
| *Solyman Brown, New York . . .                  | *Solyman Brown, A.M., M.D., D.D.S., New York City.     |
| J. S. Brewster, France . . . . .                | *C. Starr Brewster, M.D., D.D.S., Paris, France.       |
| *Sir Samuel Cartwright, England.                | *Sir Samuel Cartwright, M.D., D.D.S., London, England. |
| J. Smith Dodge, Jr., New York . .               | *J. Smith Dodge, D.D.S., New York City.                |
| *J. F. Flagg, Jr., Mass. . . . .                | *Josiah F. Flagg, M.D., D.D.S., Boston.                |
| E. L. Greenwood, Mass. . . . .                  | *Wm. Pitt Greenwood, D.D.S., Boston.                   |
| T. Greenwood, Mass. . . . .                     | *Isaac I. Greenwood, M.D., D.D.S., New York City.      |
| James S. Gunnell, New York . . .                | *James S. Gunnell, M.D., D.D.S., Washington, D. C.     |
| Daniel Harrington, M.D., Pennsylvania . . . . . | *Daniel Harrington, M.D., D.D.S., Philadelphia.        |
| C. Hayden, Dist. Col. . . . .                   | *Chester Hayden, D.D.S., Washington, D. C.             |
| A. B. Hayden, Georgia . . . . .                 | *Anson B. Hayden, D.D.S., Savannah, Ga.                |
| E. Hudson, Pennsylvania . . . .                 | *Edward Hudson, D.D.S., Philadelphia.                  |
| Leonard Koecker, England . . . .                | *Leonard Koecker, M.D., D.D.S., London, England.       |
| *Edward Maynard, M.D., Dist. Col. . . . .       | *Edward Maynard, M.D., D.D.S., Washington, D. C.       |
| *Eleazar Parmly, N. Y. . . . .                  | *Eleazar Parmly, M.D., D.D.S., New York City.          |
| T. Parmly, Louisiana . . . . .                  | *Jahial Parmly, D.D.S., New York City.                 |
| Levi S. Parmly, Mantanzas . . . .               | *Levi S. Parmly, M.D., D.D.S., Matanzas, Cuba.         |
| *Rudolph Parmly, Alabama . . . .                | *Ludolph Parmly, D.D.S., Mobile, Ala.                  |

\* Signifies deceased.

The D.D.S. in each instance is that of the American Society.



a charter to the Legislature of the State of New York, at its ensuing session, shall meet with desired success. Indeed, so few, and so reasonable are the powers and privileges requested in this charter, that the success of the application is scarcely problematical. By the period above mentioned, the Diploma will be ready for its seal, signature, and distribution" (*ibid.*, Vol. I, pp. 193, 194).

In the next issue (August and September 1841) is a Notice stating that

which appears on the covers of single numbers of the *Journal*, and on the title pages of bound volumes, beginning with Vol. II); and Solyman Brown, in his article in the *Dental Science and Art*

editor says that "This treatise contains the best practical information upon a subject intimately connected with the objects of our Journal . . . distinguished as it [the treatise] is by lucid and distinct views and various erudition. . . . We cannot too much commend the method of his [the



Original Seal of Baltimore College.



Later Seal of Baltimore College.

"The Diplomas of the American Society of Dental Surgeons are now ready for delivery to its members," (Vol. I, Nos. 11 and 12, p. 290). They were on parchment, beautifully engraved, according to the *Journal* (Vol. IV, September 1843, inside front cover), and of course bore the seal<sup>20</sup> of the Society (a wood-cut of

<sup>20</sup> This seal is in good taste, which cannot be said of the original seal of the Baltimore College, shortly abandoned for one more in the style of that of the Society. The Society's seal was adopted from the *American Journal* by the *British Quarterly Journal of Dental Science*, the second periodical of the kind, of which only two numbers were published (March and June 1843). The *British Quarterly* began the republication of Solyman Brown's "Treatise on Mechanical Dentistry," then nearing completion as an illustrated serial in the *American Journal*. The British

author's] treatise." It was republished in a revised form in Part III of Maury's "Dental Art" (1843), and was again revised for Solyman Brown's *Semi-Annual Dental Expositor* (1853-4); but that periodical was discontinued before all the Treatise was published. Thorpe says that "it was at the time the most practical work published in America"—and he might well have added, "and in the world" ("Biography of Solyman Brown"). Thorpe also records the fact that "Dr. Elisha Townsend, of Philadelphia, not so liberal-minded in those days as he became later in life, wrote Dr. Brown that he was a fool for giving away to the world the valuable secrets that it took years of hard labor to obtain." Indeed, such was the opposition to Solyman Brown's publication in his "Mechanical Dentistry" of what many considered professional secrets, that an attempt was made from unnamed quarters to remove him from his editorial position on the *Journal*; but he refused to be intimidated, as he himself tells us with some heat in Section 84 of the Treatise as published in the *Journal* (Vol. II, pp. 81, 82).



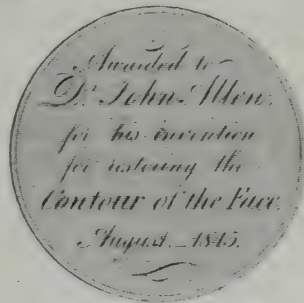
*Journal* (p. 5), says that all members of the Society (provided, probably, that they paid the "stipulated sum" above mentioned) "were furnished with an elegantly engraved Diploma as a certificate of membership." This diploma doubtless conferred the degree of Doctor of Dental Surgery; for surely Hayden and Harris would not have put the D.D.S. to their names on the College diplomas of 1842, and later, if the Society had previously abandoned its original intention of conferring the degree. Moreover, in the new By-Laws adopted by the Society at its fourth con-

There appears to be no evidence that the Society's D.D.S. was conferred after 1843, which indicates that it was abandoned about that time, probably as considered to have been rendered superfluous by the degree of the College, with which the distinguished members of the Society had been honored. And we may safely assume that the conductors of the College would not remain long in favor of the granting of degrees by the Society, especially to applicants who passed the latter's examination; whence we can understand why Harris, in the first edition of his "Dictionary of Dental Sur-

MEDAL TO DR. JOHN ALLEN.



Obverse.



Reverse.

Seal of American Society of Dental Surgery.

vention, 1843, we find it provided that the President was to sign diplomas and "confer all honorary distinctions awarded by the Society, whether degrees of Dental Surgery, medals or other testimonials" (*Am. Journ.*, Vol. IV, p. 68; September 1843). The accompanying illustration is from an engraving of one of the Society's medals, awarded to John Allen in 1845, at the annual convention of that year (in an advertising pamphlet by Dr. Allen, 1860; also see *Am. Journ.*, Vol. VI, p. 79).<sup>27</sup>

<sup>27</sup> Presentation of medals or premiums for improvements in the dental art was one of the projects of the original New York Society, as we saw above. The American Society's medal was awarded to John Allen in August 1845; and on December 16th of the same year he patented his "method or process for Restoring the natural Fulness and Contour of the Face" by means of metallic bulbs or other plumpers.

gery," defines the word "Doctor" as "a title . . . properly confined to one who has received from a regularly chartered institution or college the degree of doctor of medicine or doctor of dental surgery. The power of conferring the latter degree was first invested in the Baltimore College of Dental Surgery, by the legislature of the State of Maryland, by an Act of incorporation granted in 1840." But nevertheless we find "Chapin A. Harris, M.D., D.D.S." on

In 1847 he was censured by the Society for procuring the patent and demanding a percentage for the use of the invention; but this did not deter him from doing likewise with his Continuous-Gum Work, which was patented Dec. 23, 1851. For the latter invention he received a platinum medal from the American Dental Convention in 1876; also numerous other medals from local, national and international Expositions. John Allen was the champion medal accumulator of dentistry.

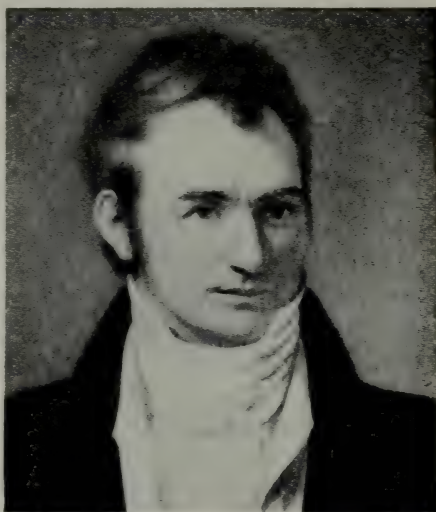
the title page, as author, of this edition of the "Dictionary of Dental Surgery" (1849); proving that he still used the Society's degree, for his only dental college degree was not received till 1854. No example of the Society's diploma is now known to exist; but a member of Augustus W. Brown's family remembers that one hung over his office desk for many years.

The charter project of the Society was still under consideration at its convention in 1843, when Eleazar Parmly, Solyman Brown and Elisha Baker "were continued a committee to prepare a memorial to be presented to the Legislature of the State of New York, asking for a charter for this Society, with the privilege of holding property to the value of fifty thousand dollars, for the purpose of erecting a building in the city of New York, as a depository of its library and other property" (*Am. Journ.*, Vol. iv, p. 69). But this three-fold committee, probably appointed in 1842, appears to have accomplished no more than Parmly alone, and we hear nothing further of the project. If application were made for a charter, it was doubtless refused, as there is no record at Albany that the Society was ever chartered or incorporated by either the Legislature or Secretary of State.

#### THE AMERICAN SOCIETY OF DENTAL SURGEONS.

As to the origin of the American Society, we have the report of some remarks by Horace H. Hayden at its first convention (in *Am. Journ.*, Vol. i, pp. 158, 159, as corrected on p. 246), in the course of which he said that "the formation of a National Society of Dentists" had been long a favorite project with himself; that he had never been wholly alone in this desire, although much opposition was encountered at first, especially in Boston: that he had consulted with Dr. Edward Hudson of Philadelphia as early as 1817, and found him favorably inclined; that he (Hayden) made another effort among his professional friends in 1829, when "he met

with much more encouragement, but not, however, sufficient to justify a belief that the plan would succeed until the year 1838 [some four years after the organization of the first society, in New York], when, in a tour to the north, he made the last attempt"—which apparently resulted in the organization of the American Society in 1840. In that year Harris called Hayden "the father of the American Society of Dental Surgeons" and "the projector of the society" (*Am. Journ.*, Vol. i, pp. 178, 179), but was



HORACE H. HAYDEN, M.D., D.D.S.  
(About 1825.)

not so emphatic in 1849; for he says in his sketch of Hayden in the "Dictionary of Dental Surgery" that "a number of dentists met in the city of New York" and formed the American Society, and that "Dr. Hayden was present on that occasion, and was unanimously chosen president, to which office he was from year to year elected until the period of his decease [in 1844]." Of course the national society movement, to be successful, required that the time should be ripe; that a considerable body of the better class of practitioners should be anxious to organize, not only for mutual improvement, but also for self-defense against the advertising charlatans of the



day. Moreover, in spite of the pioneer work done in New York by the original society, it is doubtful if the national society would have succeeded without the assistance received from the *Journal*, the very publication originally opposed by Hayden.

The birth period of dentistry as a profession belongs to the five or six years from the organization of the first society (1834) to that of the national society (1840); for this period includes the establishment of the first journal and the first college. As to the foremost leaders in the concerted movement for the elevation of dentistry at this time, we have the matured judgment of an unprejudiced professional contemporary in the words of James D. McCabe,<sup>28</sup> of Richmond, Va.: "The pride of England and France must bow to the American galaxy composed of such men as [Horace H.] Hayden, [Chapin A.] Harris, [Eleazar] Parmly, [Solyman] Brown and others, who have toiled up the steep of professional eminence, and have kindled their fires upon the summit as beacons to the world" (in *Am. Journ.*, Vol. iv, p. 174); and Elisha Baker may well be included with the four thus especially named, to make a five-fold group. Hayden and Harris have had the college to perpetuate their fame, while the New York leaders have often been forgotten in the general indifference of the profession to its early history. Thus we find R. B. Winder asserting in an after-dinner speech in 1886 that "Baltimore was the cradle of our profession. It was born there, forty-seven years ago, through the ability and the long-sightedness of one

man, Chapin A. Harris;" which moved the most eminent of the Fathers then alive, William H. Dwinelle, to speak of some of the New York men as follows:

Let us remember also the courtly and accomplished gentleman, Dr. Eleazar Parmly. He contributed to our profession the potency of his wealth, his high social position, his elegance of manners, and all that constitutes a true gentleman, at a time when we most needed them. He helped us in those early days to dignify, elevate and give respectability to dentistry. Let us remember, too, good Solyman Brown, his co-laborer and friend, whose son sits by me tonight, a noble son of a noble sire. He [Solyman Brown] was one of the few of our profession at that early date who had acquired a classical education. He came and laid the contribution of his grand intellect at our feet. He was the poet laureate of our profession, and gave us "Dentologia" and other poems,<sup>29</sup> which will be read with profit and entertainment as long as our calling is known. Let us remember genial Jahial Parmly [cousin of Eleazar], a man who did much for the elevation of our profession. . . . There was [also] Dr. J. H. Foster of New York, modest, genial

<sup>28</sup> Among the Southern men he was second to none in the concerted movement for the elevation of dentistry. He was elected a member of the American Society at its first convention in 1840; and in 1842 was one of the organizers and first Secretary of the Virginia Society of Dental Surgeons, the third organization of the kind (see *Am. Journ.*, Vol. III, pp. 145-147). His brother, John C. McCabe, was also a dentist; a member of both societies, and a contributor of meritorious poems to such periodicals as the *Southern Literary Messenger* and *Graham's Magazine*.

<sup>29</sup> Properly, "another dental poem," "Dental Hygeia" (1838). Of "Dentologia" (with Notes by Eleazar Parmly, 1833, etc.) there is a laudatory review by Chapin A. Harris in the *American Journal*, Vol. I, pp. 69-72, but no more laudatory than others found in the literary periodicals of the day. Thorpe says: "This classical poem was a marked literary production, considering the subject, and was extensively quoted at the time and favorably commented on by the best critics and writers of the profession, and had a great influence in elevating dentistry as a profession" ("Biography of Solyman Brown"). Indeed this influence was especially strong with the laity, and at a time when such influence was most needed; for the author had an enviable reputation as a poet. He has to his credit some twenty publications in prose and verse, besides being a frequent contributor to magazines and newspapers. Thorpe, apparently paraphrasing Dwinelle, calls Solyman Brown "The Poet Laureate of the Dental Profession," and "Dentologia" may well be considered the overture to the concert of action for the elevation of the profession which began with the organization of the first Society in 1834, a year after the poem was originally published.



and gentle. He contributed much by word and pen. . . . Let us not forget them. The catalog of their names is not long (in *Souvenir of the Dinner to Dr. Wilhelm Herbst* by the N. J. Dental Society, July 1886; pamphlet, p. 22).<sup>30</sup>

#### THE AMALGAM WAR.

In 1856 the American Society met its death in the "Amalgam War," which had raged in the organization for more than a decade. The violent opposition to amalgam was doubtless in large measure due to the unprofessional manner in which it was advertised and employed by the notorious Crawcour brothers, who came to this country from England in 1834. They claimed to be its "inventors," calling it Royal Mineral Succedaneum, which was denounced by Eleazar Parmly in 1835, in his Notice concerning the original New York Society (see above); and he was always an inveterate foe to the material, being the leader in the society attacks upon it, with the support of a majority of the members, including Chapin A. Harris and John B. Rich.

In 1844 the American Society (and others) branded the use of amalgam as malpractice; in 1845 an investigating committee visited twenty-two of the twenty-five New York and Brooklyn members and found only five who refused to pledge themselves not to use the material, *viz.*, John Lovejoy, Nehemiah Dodge, Augustus W. Brown,<sup>31</sup> Geo. E. Hawes, Chas. C. Allen and F. H. Clarke. A resolution was then adopted that provided for the automatic

expulsion of all members who refused to sign such a pledge. This was opposed by some, chiefly by Solyman Brown, who later became an advocate of amalgam. He questioned the right of the society to demand of its members their private practice, and contended that "no one ought to be required not to pledge himself not to use any article, as his conscience might demand that he should use it" (*Am. Journ.*, Vol. VII, p. 77). Elisha Baker shortly became converted to the use of amalgam, and had a heated controversy with Eleazar Parmly in the *Dental News Letter* and the *New York Dental Recorder* for 1847. In the same year "an association of Amalgam Dentists" was organized in New York under the name of the Society of Dental Surgeons of the State of New York, with fifty members including many of those who had resigned or were expelled from the American Society. The latter rescinded the above-mentioned amalgam resolution in 1854, but was forced to dissolve in 1855 for want of a quorum. In the meantime, Rich had become converted to amalgam (1848), resigning from the American Society, and in 1855 becoming the President of the American Dental Convention.

In 1874, Rich gave some interesting reminiscences of the "Amalgam War"; asserting that it occupied the time and attention of the American Society "almost to the exclusion of any other business, for several years"; and that "the debates in relation to it were at length carried on with a great degree of feeling . . . . Men who had been friends for years became bitter enemies, and the usefulness of the Society was at an end." He also said that no one at first took a more active part against amalgam than himself; his opinion of it being based on what he believed to be the practical experience of Eleazar Parmly, "who, at that time stood, by common consent, at the head of the dental profession in this country." But in 1848, when Rich had seen some very successful amalgam fillings and wanted to show them to Parmly, he not only found the latter unwilling to examine

<sup>30</sup> Most characteristic of Dwinelle is all this. He was a giant in stature and gentle as an old-fashioned mother: the profession probably has never known a larger heart. On his right thumb he wore a huge seal ring, which was almost as conspicuous as the diamond cross on the shirt front of H. J. McKellops, the St. Louis convivial.

<sup>31</sup> As already remarked, Augustus W. Brown always used amalgam extensively. In his old age his left hand was closed by paralysis as a result (or so he believed) of the early practice of mixing the mercury with the alloy in the palm of that hand, using the right thumb as a pestle.

them, but was amazed to hear him say: "I have neither used nor experimented with it in any way. I would not touch the nasty stuff!" Rich added that this ended his professional intercourse with Parmly, and proceeded to describe some of his own laboratory experiments with amalgam, the encouraging results of which were presented to the American Society in an effort to have it restore to membership those who had been expelled or forced to resign; but the Society refused to take such action or "examine the subject at all," so Rich resigned forthwith (in *Transactions of New York Odontological Society, Special Meeting, December 14-16, 1874*; pp. 61-65; and pamphlet, pp. 39-42).

Differences of opinion on the amalgam question had no effect on the long and intimate friendship of Eleazar Parmly and Solyman Brown, which continued till the death of the former in 1874; but an unfortunate estrangement over another matter arose between Harris and Hayden shortly before the death of the latter in 1844. This is passed over in silence by our historians and biographers; but it elicited some caustic words from both men, which appear in the *American Journal* for March and June 1843. It seems that each had presented a paper on the same subject, "The Maxillary Sinus," to the American Society in 1842, and that the paper of Harris alone was published in the *Journal*; whereupon Hayden proceeded to write, and the *Journal* to publish some lengthy and very sarcastic "Comments" on the Harris paper; together with a criticism of the *Journal* itself for what Hayden calls its "manifest neglect" in not exposing "the errors of opinion . . . misguided views and unsound theories" in some of its original articles and reprints of books (Vol. III, p. 203). These "Comments" received a little less sarcastic reply from Harris in the next issue of the *Journal*, in which he defends its "editorial triumvirate" of that year (Harris, Brown and Mackall), and intimates that Hayden had resorted to a course of action in connection with the above-mentioned papers that was not be-

yond censure or free from want of brotherly love (*ibid.*, pp. 286-290). Hayden was 72 years old at the time of the convention in 1842, while Harris was only 36, active and practical and rapidly rising to professional eminence. Apparently Hayden was never overpleased at the success of the *Journal*, which he had originally opposed; and in all probability a growing jealousy of Harris was the underlying cause of their estrangement.

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#### APPENDIX.

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##### STATEMENT OF DR. JOHN B. RICH.

DR. RICH TO DR. E. PARMLY BROWN—

He wanted me to give him the history of American Dentistry as a science. 95 years old. The only one living. Dwinelle a great deal younger. I was the youngest man that started the first Dental College. Hayden started the idea.

I started practice the 20th of March, 1836. Two Nelson Brothers, twins, Albany. Concerted action for elevating the profession. Meeting at your father's house, opposite Niblo's. 25 or 30 dentists present,—meeting did not amount to anything. Your father was always very enthusiastic. At this meeting your father was elected President, I was Secretary. Called on every dentist in New York to get his opinion on organization. "If we elevate all these men you say know nothing, we are elevating ourselves." We had a personal interview with every dentist in New York. The profession was not one to be proud of in those days. Of the 69 some were barbers, cuppers, leechers and toothdrawers.

About that time (1836) we tried to establish a journal with your father as editor. Dr. Parmly, Dr. Baker, your father and I raised enough money to get out a few copies of the first number of the *Journal*. We managed to get out 12 numbers in about 18 months; the second volume two years afterward.

In the meantime the American Society of Dental Surgery formed an organization.

The reason the college could not be established in New York was that the men whom we appointed as professors would not serve because there was no money in it and they could not spare the time. Your father was Emeritus Professor. He was willing to serve, but no one else. We gave up the idea for a



year or two. If we had the college in Baltimore, a man would give his time to it, and become the Dean. The \$1,300 for the start was subscribed by thirteen of us in New York, —\$100 each (and it was not very easy to get that much at that time, either).

It was ten years before the college paid. Only two students the first term,—one Philadelphia man and one Southerner. Gardette opposed to it. All 69 dentists gone except myself. I was educated abroad as a medical doctor.

Parmy tried to get a chair of dentistry in medical college, but did not succeed. I used to be ashamed of the profession. Have a son in London, 74 years old. I married in Egypt. Wife died 13 months afterward. I then lived among the Arabs for 16 months. Have had two wives since.

Went back to Paris by invitation of man who educated me. Ran away from home in New York when nine years old. Learned dentistry from Delabarre in Paris. Used to meet him in Florence at the galleries; one morning he invited me to breakfast with him. At that time a great many English people lived on the continent because it was cheaper than to live in England. The only means of travel was the diligence. Delabarre wanted to go to Rome for holy week and found that all the seats in the diligence had been taken by the English, and that he could not get there in time. "I am going and have a coupé of my own, with a place for books and a place for cooking, and a servant on the rumble, and would be glad to have you go with me." So we went to Rome for the carnival. The old man wanted to return the courtesy and offered to teach me his business. He sent for the books—there were very few at that time. He let me practice on his patients. What he taught me did not amount to a row of pins. When I came back to this country I found that my money had been lost, and that I had to have something to do. Dr. Fogg, a dentist working on my teeth, persuaded me to go into partnership with him, for one year.

I soon mastered all that he knew. We dissolved partnership and I took the room next to his. He would not allow me to have a sign. I went to John Street six or seven years afterward—1842. Fogg was bitterly opposed to my belonging to the society; he would not go into the college.

Foremost dentists at that time: Hudson in Philadelphia, El. Parmly here, Bridges in Brooklyn, and Pat. Houston. Each gave \$100 for starting college.

I was theatrical and musical critic for the *Truth-teller*. Given a dinner at Martinelli's after fifty years' practice.

We sent American dentists all over the world. Brewster was the first.

I was at Maynard's in Washington when Evans came in to get his influence to get an appointment as Bearer of Despatches to Paris. Evans went to Brewster in Paris,—who was a rough operator,—filled fifty teeth in one day. Showed samples which astonished Brewster. Evans' wife liked Paris and she persuaded him that there was more money to be made there than in their home town of Lancaster, Pa. He asked Brewster about practicing in Paris, and Brewster proposed a partnership. He went into partnership with Brewster then and there on the second interview, after talking it over with his wife, and finally bought Brewster out for \$100,000.

Mrs. Evans was a very beautiful and diplomatic woman, and had managed to become acquainted with Prince Louis Napoleon when he was exiled in London, and when he came back to Paris as member of the Assembly he made his home with the Evans. He never forgot his friends, and the intimacy was always kept up. Evans gave the Prince the use of his bank account. Mrs. Evans introduced him to Princess Eugénie, and Dr. and Mrs. Evans were always entertained *en famille* at the royal palace.

Evans was a sycophant and a man worshipper. He would do anything to curry favor.



## What is "Safety First" in the Treatment of Pulpless Teeth or Teeth with Non-vital Pulps?

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(Read before the annual meeting of the Dental Society of the State of New York, Albany, May 12, 1920.)

THERE is more or less confusion among the members of the dental profession as to what constitutes a conservative, logical and reliable procedure in the treatment of pulpless teeth. This paper has been written with the hope of stimulating a discussion which may bring forth a classification of diagnosis and give some basis for workable prognosis.

The average practitioner desires to know when and when not to attempt root-canal filling. The safety and well-being of our patients demand that all who attempt these operations should know in advance when success is assured, or when they are liable and foredoomed to failure.

### CLASSIFICATION OF NON-VITAL TEETH.

Roughly speaking, we can divide teeth with non-vital pulps into three classes:

*First.* Teeth with non-vital pulps which have not received treatment.

*Second.* Teeth with non-vital pulps partially removed, and roots partially filled.

*Third.* Teeth with roots apparently completely filled.

Radiographically, each class may be divided according to the indications of changes which have taken place around the root ends. It is known, however, that these radiographic interpretations are not always conclusive. There are records of patients with teeth having non-vital pulps which showed no radiographic indications of any changes hav-

ing taken place around the root ends, yet these patients have been greatly benefited or cured of their troubles, when these teeth were removed. There are also records of pulpless teeth being removed and abscesses found attached to the root ends, and infected areas found even when several radiographs had been taken and none showed any changes in the tissues about the root ends. There are also many cases where radiographic findings indicate infection, even to the extent of being diagnosed as blind abscesses, yet the patient gives no history of systemic or local troubles.

In the midst of all these uncertainties and seeming contradictions, what is a safe and sane procedure, and how shall we advise our patients?

During the past fifty years American dentistry has made an enviable and honorable reputation throughout the world. No tooth was so badly decayed, or broken down, but that an American dentist could fill it, and save it. A large part of our reputation has been based on this fact. It is not easy, therefore, for our profession, as a whole, to take kindly to any proposition, which seemingly denies their ability to save all teeth. Dr. Percy Howe of Boston very frankly states, "The reason I talk against extensive extraction is that when we resort to this we admit failure—we admit that after all dentistry is not the broad profession that I believe it to be."<sup>1</sup> Dr. Howe has touched the spot that hurts. Our profession feels that to lose a tooth is proof of failure.

## LIMITATIONS OF DENTISTRY.

This is not true. We are only beginning to learn our limitations. We are also beginning to realize the greater opportunity which presents itself to us. We are standing at the threshold of a new and grander day when dentists will consider the conservation of the health of the whole body. We are learning to take a broader view of the importance of our work, because we consider the welfare of the individual first. To save the life or the health of his patient the surgeon does not hesitate to cut off an appendix, a hand, a foot, or a leg, and the operation is counted a success when the life is saved, or the health improved.

The profession of dentistry is not a failure, even though every pulpless tooth in the world were to be extracted tomorrow. The dental profession will take a wonderful step forward when it realizes the greater value of its services to the health of the whole body, rather than to the saving of one or more teeth within that body.

In what position do we find ourselves today with regard to the question of pulpless teeth, or teeth with non-vital pulps?

On the one side are those who advocate the retention of these teeth, claiming it is possible so to treat and fill them that no harm can come from them, regardless of how long the pulps have been non-vital. Evidence is offered that a large percentage of pulpless teeth having completely filled roots show no radiographic indications of change in the area surrounding the root ends. Also that there are thousands of persons with pulpless or partially pulpless teeth, who seemingly enjoy good health and who show no systemic troubles of any kind.

We all realize that the human body is a wonderful organism and able to take care of itself against great odds, but this must not blind us to the fact that it is our province to prevent conditions dangerous to health, and to remove those conditions when present. We should use our best efforts to obtain and maintain the normal or natural condition of all

parts of the body. Any deviation from normal is to be viewed with suspicion, particularly when the change is a pathologic one.

On the other side are those who believe it is *safer* for the patient to have pulpless teeth removed. Their claims are long and numerous, and seemingly sustained by figures, facts and logic.

The larger percentage of systemic disorders among those having pulpless teeth or teeth with non-vital pulps, as compared with those who do not have these teeth, is explained by those who advocate their retention, that the work of pulp removal was not correctly done, nor were the roots properly filled; and also that the cause which produced the systemic troubles, may also have produced the infection about these teeth.

In one of the dental magazines the claim was made that 90 per cent. of roots with complete fillings showed no *infection* around root ends. No figures were offered as to the size of the class, nor as to the constitutional history of the patients, nor if there were other pulpless teeth in the mouth. It is to be noticed in this connection how very seldom are any records of constitutional history given in the discussions of complete root fillings. Satisfaction is shown in the mere statement that such teeth do not show radiographically any radiolucency. I believe that the history of constitutional conditions, prior to and after root-canal work, must always be included in any report before a decision is reached as to the success of the operation. This history should include blood examination.

## ARGUMENTS FOR THE REMOVAL OF NON-VITAL TEETH.

The argument presented by those who advocate the removal of teeth having non-vital pulps may be stated as follows:

*First.* Nature supplies every tooth with nerves, bloodvessels, and lymphatics to maintain its vitality and power of resistance. When these are removed the tooth becomes susceptible to attack from within and without.



*Second.* The increase of systemic troubles among persons having pulpless teeth, or teeth with non-vital pulps, as compared with those not having pulpless teeth, is too large to be considered unrelated.

*Third.* The number of health restorations after removal of pulpless teeth, is too large to permit denial that a large percentage of these systemic troubles are traceable to the presence of pulpless teeth, and that these teeth are a large factor in their production.

*Fourth.* It has not yet been shown conclusively, nor yet scientifically proved, that the retention of pulpless teeth, even though completely filled to their root ends, do not sooner or later bring about systemic disturbances.

*Fifth.* It is better judgment for the present to remove pulpless teeth until research work shall prove what is a scientific and proper procedure for the treatment of such teeth, and what are the possibilities of their retention without producing systemic disturbances or aggravating those that are present. We must not risk our patient's health or perhaps his life by experimental and unproved work in his mouth when such serious consequences are possible.

*Sixth.* The greatest danger lies in the fact that pulpless teeth do not as a rule bring about sudden systemic disturbances.

*Seventh.* Any systemic disturbance brought about by pulpless teeth is slow but accumulative, and in many cases the secondary infection becomes so well established that the removal of the primary infection cannot bring about a cure.

*Eighth.* "Infections of the dental pulp, pulpless teeth, and apical abscess are theoretically the most dangerous of the various forms of dental foci. They are usually free from symptoms and hence unsuspected. They are situated in osseous tissue which allows no expansion. They lack drainage other than into the circulation and are exposed to pressure transmitted by the teeth during mastication. They remain active and do not heal for a period of years, and the bacteria are not encapsulated as is usually

assumed, but are found in areas of active inflammatory reaction where new blood-vessels form and afford ample drainage into the circulation."<sup>2</sup>

*Ninth.* "It is doubtful whether any form of medication through the root canal, which would be applicable in routine practice can be relied on successfully to sterilize the infected area about abscessed teeth and to prevent the areas from becoming reinfected."<sup>2</sup>

*Tenth.* "There is evidence that streptococci, which are isolated directly from septic processes in man, are more dangerous to man than similar organisms which have been living as saprophytes on the skin or mucous membrane. As a rule, growth within an animal body enhances the virulence of a microbe for that particular species, and this seems to be especially true in the case of the bacteria of blood-poisoning." ("Streptococci and staphylococci."<sup>3</sup>)

During the past few years those who have advocated the removal of pulpless teeth for the foregoing reasons have been called *Radical*. Is it not time to change this? Is not "Safety First" a conservative measure?

Are not those who think of the life and health of their patients as being more important than the retention of two or three pulpless teeth the real conservative members of our profession?

Are not those who advocate the retention of pulpless teeth by procedures not yet proved safe the radical members of our profession?

Dr. Arthur D. Black, in his lecture upon "Relation of Chronic Mouth Foci to Systemic Conditions" says: "Notwithstanding the fact that the majority of persons who have these abscesses are not at the time suffering from secondary manifestations, . . . I think it does not modify our duty at all in the matter of clearing up the infection. For example, here is a person whom a physician may examine and find perfectly fit today, and he goes out and gets thoroughly soaked in a chilly rain, and day after tomorrow is down with pneumonia, because of an abscess at the end of a root of a tooth. . . . It has been demon-



strated thousands of times in the trenches in France. If a fellow, absolutely fit for service, is reduced in resistance by lack of food, fatigue, lack of sleep, or getting soaking wet in the trenches, he may be down within forty-eight hours with pneumonia, which he would not have had but for a local focus of infection somewhere. We must treat every case of chronic mouth infection as a definite menace to the health of the individual regardless of whether he is thoroughly well or not at the time of our examination. We cannot do our duty by eliminating mouth infections for only those cases referred to us by a physician, or who come to us with known secondary lesions. It is more important to clean up the mouths of those who have not the secondary lesions. Here is a chance in preventive medicine to accomplish a really wonderful thing . . ."<sup>4</sup>

Those who advocate the retention of pulpless teeth, even when they show convincing radiographic indications of infection, little realize that this is analogous to asking a physician to allow an infected and pus-producing tonsil to remain until secondary infection has been produced, and then to still retain the tonsil until it is proved that the particular bacteria which produced the infection in the tonsil are the identical bacteria that produced the secondary infection.

"Safety First" demands the removal of all focal infection no matter where located or when and how found.

Conduct the experiments in bacteriological laboratories to prove the identity of the cocci in primary and secondary infection, but do not leave these dangerous cocci stud-farms in the body once they have been located.

While it is true there are many thousands of persons with pulpless teeth who appear to possess health, this cannot be accepted as positive evidence.

The following facts should first be considered:

The age of the patient.

The length of time the teeth have retained non-vital pulps and septic matter locked within them before being treated.

The susceptibility of the patient.

The life, environment, and occupation of the patient.

The fact that such teeth do not bring about sudden changes in systemic conditions.

Septic conditions brought about by such teeth are slow, but accumulative. Radiographic findings are not always conclusive. A great deal of damage may be done before the tooth is accused of guilt. The condition of the blood is not known.

I agree with those who claim that there is too much careless and uncalled-for extraction of teeth. At the same time, there are too many teeth with non-vital and septic pulps being saved and retained without any rational basis for their retention. But, at the present time, what is there to guide us?

Dr. E. S. Talbot believes "a patient's health is worth more than all the teeth," and does not hesitate to remove all pulpless teeth when all other sources of infection have been excluded. Dr. Talbot claims to have cured cases of "arthritis deformans, headaches, indigestion, boils, skin eruption, large glands in the neck supposed to be due to tuberculosis, and other diseases by removing pulpless teeth, even though they did not show defects in the X-ray."<sup>5</sup>

In the Metropolitan Life Insurance Co.'s dental clinic a careful examination of two thousand cases showed 118 per cent. increase of neuralgia and neuritis among patients with pulpless teeth as compared with those who did not have pulpless teeth. An increase of 164 per cent. of nervous troubles; an increase of 87 per cent. of furuncles; 75 per cent. of skin troubles, etc. While this is too small a class from which to deduce dogmatic conclusions, the percentage of increase is so large that it makes it important for us not to assume the responsibility of believing that pulpless teeth can be retained with impunity, and that nothing more is needed than a radiograph, showing perfect root fillings.

Why should we find this increase of systemic troubles associated with pulpless teeth, if these pulpless teeth have

no relation to them? It is often claimed that constitutional conditions affect these teeth; that focal infection in other parts of the body will affect the root ends, and that infection will appear. Here again no figures are given, nor is it stated this only happens with teeth, the roots of which are imperfectly filled. As far as we know this may happen upon teeth with perfectly filled roots, as well as upon teeth with imperfectly filled roots.

#### ACQUIRED IMMUNITY QUESTIONABLE.

Many believe that persons may become immune to streptococci infection, but this is not borne out by the latest investigations.

In "General Bacteriology" by Professor Jordan we find the following statement: "The immunity conferred by a natural streptococcus infection is probably never very high, and is relatively transient. There appears to be considerable individual variation . . . Animals can be immunized by the injection of filtrates of virulent cultures, or by the injection of dead, then attenuated, and finally virulent cultures."<sup>6</sup>

"In spite of extensive researches by many investigators upon the nature of the poisons produced by streptococci, our understanding of these substances is still very incomplete. The grave systemic symptoms so often accompanying comparatively slight streptococcus lesions argue strongly for the production by these micro-organisms of a powerful diffusible poison."<sup>7</sup>

"The portal by which bacteria gain entrance to the human body is of great importance in determining whether or not disease shall occur. Typhoid bacilli rubbed into the abraded skin may give rise to no reaction of importance, while the same micro-organisms, if swallowed, may cause fatal infection. Conversely, virulent streptococci, when swallowed, may cause no harmful effects, while the same bacteria rubbed into the skin may give rise to a severe reaction."<sup>8</sup>

Hiss and Zinsser agree with Jordan as to the very slight powers of immunization brought about by streptococcus

infection: "For reasons not wholly understood at present, recovery from streptococcus infection does not to any marked degree produce immunity against these bacteria." While Denys, Henger, Favel, Aronsen and other investigators have been able to produce antistreptococcic sera or immunization in animals, the procedure as to any benefits being derived by man is still uncertain. But in all these cases the immunization is only secured by artificial means and is not brought about from the direct absorption into the circulation from the original foci.

In a recent editorial in the *Journal of Laboratory and Clinical Medicine* summing up the year's work in bacteriology it says: "There is very little evidence in human or animal pathology, which would lead us to suppose that recovery from streptococcus infections leads to any considerable or durable degree of acquired immunity. A survey of the experimental work that has been done in producing active immunity against streptococcus infection by means of vaccines, and particularly the possibility of its application in human beings, shows it to be practically negligible. . . . We may still confess to a justifiable skepticism as to whether there is any streptococcus immune serum that has been proved of practical therapeutic value."<sup>9</sup>

#### PROCEDURE OF THE DENTIST IN REFERRED CASES.

I shall not give a procedure for an examination of the whole mouth, nor describe any method or methods for ascertaining which teeth have non-vital pulps. The question for us to decide is a definite one. The patient has been referred to us by his physician, and radiographs showing several teeth with non-vital pulps are present.

Shall these teeth be treated and retained, or shall they be extracted?

There is certain information that must first be obtained before we shall have the necessary data on which to base our conclusions. It is because we are



willing to act or advise with little or no information that we subject ourselves to the just criticism of being unscientific practitioners of surgery. I maintain that dental surgery is no different from other surgery in the necessity for having proper and sufficient data on which to base our judgment as to the kind of operation advisable in the circumstances. We should secure the following facts:

Age of patient.

Are there other foci of infection?

Radiographic findings.

Susceptibility of patient.

Length of time septic matter has been in the tooth.

What treatments have been given and when?

Constitutional conditions.

Blood examination.

Dr. Barker of the Johns Hopkins University tells us that when there is any systemic trouble in the young, say, under twenty, as a rule the teeth need not be suspected. We should look elsewhere. In persons over thirty or forty we should at once examine the teeth. Dr. Barker also believes that from 80 per cent. to 88 per cent. of the focal infections that bring about systemic troubles originate above the shoulders, and of these the majority come from the teeth.

By using the susceptibility chart suggested by Dr. Price of Cleveland, we shall be able to ascertain if the patient is predisposed to certain diseases. The history of the patient is recorded as well as that of the father and of the mother. The present constitutional condition of the patient is secured, which includes information as to the presence of other focal infections. All other focal infections must receive attention and be eradicated. If there is an area of infection around a root end and other foci of infection are known to be present, we are not justified in attempting to retain these teeth. This patient shows a susceptibility to focal infection, and even though the dental work were perfectly done the possibilities of reinfection are indicated by the susceptibility already shown. In making a radiographic diagnosis, we should not be satisfied with

only one radiograph. It is more satisfactory to take two or three at different angles. It is necessary to ascertain as accurately as possible how long the pulp has been non-vital, and what treatment used. It is doubtful if any drug now at our disposal can be relied upon to disinfect the dentin of a tooth that has been exposed to the influence of septic matter for several years.

Recent investigations tend to show that blood supply is conveyed through the peridental membrane, the cementum, and into the dentin. If this is so, the vitality of the tooth is not wholly dependent upon the blood supply within the tooth. It should be possible to remove a vital pulp that has hardly become septic and to have an aseptic operation so that no septic matter may enter the circulation, or be left within the tooth. But all septic dentin must be removed from the entire length of the root canal, for if nourishment can be conveyed through the peridental membrane, cementum and into the dentin, then it is also possible to convey septic matter from septic dentin through the cementum, peridental membrane and into the circulation without passing through the apices of teeth. This possibility must be kept in mind when considering this problem.

#### BLOOD EXAMINATION.

The blood examination should include blood count and the complement fixation test. At the present time the blood count and blood fixation test are somewhat difficult and tedious. I believe this is largely owing to the fact that not enough of it is being done to enable a more simple and routine procedure to be devised. Nevertheless, if it can and does enable us to ascertain positively and scientifically the presence of dental focal infection or its absence, we should use it.

A classification of pulpless teeth with their diagnosis and treatment is herewith offered, not as a complete and final standard, but rather as a suggestion for a form to be worked out and accepted after discussion. I will ask you to keep in mind the viewpoint which has guided



me in this paper, and that is the safety of the patient first, last, and all the time. We must also separate that which is known from that which is as yet unproved.

It has not been proved scientifically that it is possible to disinfect and bring about recalcification of diseased bone tissue around root ends, and if in bone surgery the removal of all diseased bone is necessary for success, why should we expect different results can be obtained with bone tissue surrounding root ends?

We must be just as jealous for the

success of our work, as is any surgeon in the performance of any delicate and dangerous operation. Before we treat and fill a tooth with a non-vital pulp, we must assure ourselves of the non-existence of any focal infection elsewhere in the body. How many of us take the time and trouble to find out the constitutional condition of our patients? How many have a blood or urine test made before deciding upon the advisability of retaining pulpless teeth? How many ascertain the susceptibility or degree of immunity of the patient?

#### CLASSIFICATION OF PULPLESS TEETH.

##### Group A. Teeth with Non-vital Pulps and Unfilled Root Canals.

###### CLASS I.

Radiographic examination.	Show radiolucency.
Systemic disturbances.	Present.
Other foci of infection.	None.
Blood examination.	Show streptococcus.
Susceptibility history.	Positive.

*Treatment.* Extraction.

###### CLASS II.

Radiographic examination.	No radiolucency.
Systemic disturbances.	Present.
Other foci of infection.	None.
Blood examination.	Show streptococcus.
Susceptibility history.	Negative.

*Treatment.* Treat and fill. If systemic troubles still continue, make another blood examination, and, if it shows streptococcus reaction and there are no other foci of infection, then extract.

###### CLASS III.

Radiographic examination.	No radiolucency.
Systemic disturbances.	None.
Other foci of infection.	None.
Blood examination.	Show streptococcus.
Susceptibility history.	Negative.

*Treatment.* Treat, fill, and make another blood examination. If streptococci are still present, extract.

###### CLASS IV.

Radiographic examination.	Show radiolucency.
Systemic disturbances.	None.
Other foci of infection.	None.
Blood examination.	Show streptococcus.
Susceptibility history.	Positive.

*Treatment.* Extraction.

###### CLASS V.

Radiographic examination.	No radiolucency.
Systemic disturbances.	None.
Other foci of infection.	None.
Blood examination.	None.
Susceptibility history.	Negative.

*Treatment.* Treat and fill. Within six months make a blood examination. Each year a complete examination of this tooth should be made.

**Group B. Teeth with Non-vital Pulp and Partly Filled Root Canals.****CLASS I.**

Radiographic examination.	Show radiolucency.
Systemic disturbances.	Present.
Other foci of infection.	None.
Blood examination.	Show streptococcus.
Susceptibility history.	Positive.

*Treatment.* Extraction.

**CLASS II.**

Radiographic examination.	No radiolucency.
Systemic disturbances.	Present.
Other foci of infection.	None.
Blood examination.	Show streptococcus.
Susceptibility history.	Negative.

*Treatment.* Treat, fill, and make blood examination. If streptococci are still present, **extract**.

**CLASS III.**

Radiographic examination.	No radiolucency.
Systemic disturbances.	None.
Other foci of infection.	None.
Blood examination.	Show streptococcus.
Susceptibility history.	Negative.

*Treatment.* Treat, fill, and make blood examination. If streptococci are still present, **extract**.

**CLASS IV.**

Radiographic examination.	Show radiolucency.
Systemic disturbances.	None.
Other foci of infection.	None.
Blood examination.	Show streptococcus.
Susceptibility history.	Positive.

*Treatment.* Extraction.

**CLASS V.**

Radiographic examination.	No radiolucency.
Systemic disturbances.	None.
Other foci of infection.	None.
Blood examination.	None.
Susceptibility history.	Negative.

*Treatment.* Treat and fill. Within six months make another blood examination. Each year a complete examination of this tooth should be made.

**Group C. Pulpless Teeth with Complete Root-canal Fillings.****CLASS I.**

Radiographic examination.	Show radiolucency.
Systemic disturbances.	Present.
Other foci of infection.	None.
Blood examination.	Show streptococcus.
Susceptibility history.	Positive.

*Treatment.* Extraction.

**CLASS II.**

Radiographic examination.	No radiolucency.
Systemic disturbances.	Present.
Other foci of infection.	None.
Blood examination.	Show streptococcus.
Susceptibility history.	Positive.

*Treatment.* Extraction.

## CLASS III.

Radiographic examination.	No radiolucency.
Systemic disturbances.	None.
Other foci of infection.	None.
Blood examination.	Show streptococcus.
Susceptibility history.	Positive.

*Treatment.* Extraction.

## CLASS IV.

Radiographic examination.	Show radiolucency.
Systemic disturbances.	None.
Other foci of infection.	None.
Blood examination.	Show streptococcus.
Susceptibility history.	Positive.

*Treatment.* Extraction.

## CLASS V.

Radiographic examination.	No radiolucency.
Systemic disturbances.	None.
Other foci of infection.	None.
Blood examination.	Negative.
Susceptibility history.	Negative.

*Treatment.* Do nothing.

**Group A. Teeth with Non-vital Pulp and Unfilled Root Canals.**

## CLASS I.

Radiographic examination.	Show radiolucency.
Systemic disturbances.	Present.
Other foci of infection.	None.
Blood examination.	Show streptococcus.
Susceptibility history.	Positive.

*Treatment.* Extraction.

In Group A, Class I, we find the radiographic examination shows a rarefied area surrounding the root end. As the blood examination gives the presence of streptococcus and there are no other foci of infection, we are safe in assuming that this rarefied area is infected bone tissue. The patient is suffering from one or more systemic troubles, and these troubles are considered to be attributable to focal infection. The susceptibility chart of Dr. Price has been used, and the history shows a predisposition toward these ailments. In such a case as this no time should be lost. Extraction is the treatment indicated. How can we justify ourselves in any attempt to treat and retain such a tooth? On the one side are positive facts borne out by scientific knowledge, and on the other side hopes, beliefs and theories unproved.

## POSITIVE FACTS.

1. It is well known in bone surgery that removal of all diseased bone is neces-

sary and if this is done healing occurs without antiseptic treatment.

2. "Apical blind abscesses or infection lack drainage other than into the circulation."<sup>10</sup>

3. Patient is suffering from systemic troubles that are traceable to focal infection. No other foci of infection. Blood examination shows streptococcus reaction. Patient gives history of susceptibility. Removal of tooth, and removal of infected area will positively stop any more absorption of septic matter into the circulation.

HOPES, BELIEFS AND THEORIES  
UNPROVED.

1. Perhaps I can remove all septic matter from the tooth though I do not know how far it has penetrated into the dentin.

2. Perhaps treatment will disinfect the bony tissues surrounding the root ends, even to the depth of a quarter of



an inch, and the decomposed bone tissue will be removed and new bone built up.

3. Perhaps the patient will regain health.

Frankly, are not these the facts? What positive scientific knowledge have we today that such a tooth can be treated and filled with no danger in later years to the health of the patient? Are we

justified in jeopardizing our patient's health in such a case as this by any procedure as yet unproved? Will it not be more conservative for our profession to only practice within the limits of what is known positively and scientifically, and refrain from experimental work in the mouth which can bring criticism on our profession and the possibilities of disease for the patient?

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#### CLASS II.

Radiographic examination.

No radiolucency.

Systemic disturbances.

Present.

Other foci of infection.

None.

Blood examination.

Show streptococcus.

Susceptibility history.

Negative.

*Treatment.* Treat and fill. If systemic troubles still continue, make another blood examination, and, if it shows streptococcus reaction and there are no other foci of infection, then extract.

Group A, Class II, shows no structural changes having taken place around root end. Inasmuch as streptococcus reaction is found in the blood and as there is no other focus of infection, the infection must have drained from the tooth. Destruction of bone tissue is not shown and therefore the bone is not necrotic and probably not infected. In this case we

are justified in making an effort to save the tooth. But we must not dismiss the patient and trust to luck. If systemic troubles do not clear up, and another blood examination still shows the streptococcus reaction, and again no other focus of infection can be found, "Safety First" demands the removal of the pulpless tooth, no matter how beautifully filled.

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#### CLASS III.

Radiographic examination.

No radiolucency.

Systemic disturbances.

None.

Other foci of infection.

None.

Blood examination.

Show streptococcus.

Susceptibility history.

Negative.

*Treatment.* Treat, fill, and make another blood examination. If streptococci are still present, extract.

Group A, Class III. In a case like this, there is every reason to believe with careful technique this tooth can be treated and filled and give good service for many years. A blood examination should be made within six months, and

if streptococcus reaction is still present, extract. Watch should be kept on these cases, and patients instructed to report as soon as they have any constitutional troubles.

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#### CLASS IV.

Radiographic examination.

Show radiolucency.

Systemic disturbances.

None.

Other foci of infection.

None.

Blood examination.

Show streptococcus.

Susceptibility history.

Positive.

*Treatment.* Extraction.

Group A, Class IV. As the X-ray shows infection, and the blood examinations show streptococcus reaction, and the patient is susceptible, extract.

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CLASS V.

Radiographic examination.	No radiolucency.
Systemic disturbances.	None.
Other foci of infection.	None.
Blood examination.	None.
Susceptibility history.	Negative.

*Treatment.* Treat and fill. Within six months make a blood examination. Each year a complete examination of this tooth should be made.

Group A, Class V. This class is the most promising in all this group. We should, however, request the patients to report any illness they may have, and from time to time, we should make blood and radiographic examination.

Groups B and C are sufficiently self-explanatory not to need any further description than has been given to Group A.

In conclusion, I beg to call attention to the importance of "Safety First" for the patient and to remind you of the fact that the greater responsibility rests upon us in advising patients to retain teeth with non-vital pulps. We must be conservative in our procedure and feel more than reasonably assured that no harm to the health and life of our patient will

follow the retention of such dental organs.

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  - <sup>8</sup> HISS and ZINSSER. "Bacteriology," p. 183.
  - <sup>9</sup> Editorial, *Journal of Laboratory and Clinical Medicine*, November 1919.
  - <sup>10</sup> E. C. ROSENOW. *Journal Dental Research*, Vol. i, No. 3.
- 576 FIFTH AVE.

## Trifacial Neuralgia: A Word of Caution to Dentists.

By LEON HARRIS, M.D., D.D.S., New York, N. Y.

AN article under the above caption by Dr. Carlton N. Russell which appeared in the April issue of the DENTAL COSMOS, should be of peculiar interest to dentists, first because it is a very excruciating malady, and secondly, affecting as it does a part of the human anatomy closely associated with the field of dental operations, it comes under the care of dental surgeons with greater frequency than any other disease, not necessarily of dental origin. As a matter of fact, *tic douloureux*, as it is commonly called, is often referred to the dentist when it should be referred to the internist, because of the mistaken notion that the teeth are in some manner involved in its etiology. The dentist does not take the case up as a matter of study and investigation but rather accepts it as a case with an established diagnosis which is sent to him for treatment, which treatment usually resolves itself into the extraction of several teeth, with a very unfavorable prognosis.

The main features of trifacial neuralgia have been very ably covered in the article by Dr. Russell so that there is very little need of my going over the field again. I should like, however, to emphasize certain points, from the dentist's viewpoint. There are many cases of facial pain which are undoubtedly of dental origin. Most common are the cases of hidden caries which cannot be detected by any means of probing, situated along the roots high under the gingival margin and which are brought out by a radiographic film. The extraction of such teeth when duly discovered is followed by immediate relief. Cases of acute pericementitis, pulpitis, and impacted teeth will often simulate trifacial

neuralgia, and their treatment will undoubtedly be followed by immediate relief. This, however, is not the true trifacial neuralgia.

The typical cases of "*tic douloureux*," express themselves in a periodic, sharp, piercing, lancinating pain over the points of distribution of the trifacial nerve, excruciating in character and aggravated by the slightest touch, such as merely touching the part with the finger. These cases are most frequently not of dental origin, and just as often severely abused by the dentist, who proceeds to extract one tooth after another, leaving the mouth almost edentulous, with absolutely no beneficial effect. It is against this abuse of dental practice that I wish to voice my protest, as I have in the last few years seen several cases that have been referred to me, each wearing full upper and lower plates, and continuing to suffer to the same extent as before the intervention of the dentist.

### DIAGNOSIS.

When confronted with a case of "*tic*" the dentist should make a most exhaustive study of the patient's mouth to determine the nature of the ailment, and the bearing that the teeth have upon it. Thorough inspection of the mouth, the teeth, and the gums, the presence of salivary calculi, the condition of the gums, should be made. The pulp of each tooth should be tested with the electric current, and radiographs of the teeth must be made, followed by a sinus plate. The presence of sharp portions of process under the gums must be noted and surgically removed. After all these exhaustive tests have been instituted, and



all the facts correlated, we must try to determine what relationship the teeth have, if any, in producing the condition.

Very often in the typical cases of "tic" we find that the dental structures can be exonerated as a contributory cause. The case should then be referred back to a physician and preferably to a neurologist for further investigation. Very often intracranial changes, will be found to be responsible, at other times constitutional disturbances, especially those of a chronic inflammatory nature, such as arterio-sclerosis, syphilis or tuberculosis. Whatever may be the underlying cause, we must not forget that the indiscriminate extraction of teeth will not result in the slightest benefit to the patient and only tend to deprive him of some very useful organs.

The presence of a tumor at the pontocerebellar angle as happened in one of Dr. Russell's cases should be indelibly inscribed on every dentist's mind as a reminder of extraneous causes of "tic" other than the dental structures.

One of my recent cases came in to see me one morning with the most excruciating pains over the right side of the face, and profuse lacrimation. Several of his molars on that side had already been extracted with a resultant exacerbation rather than alleviation of his sufferings. A thorough and under the circumstances difficult examination of his teeth and sinuses convinced me that the cause of the "tic" was elsewhere. Opiates, hot applications, analgesics and even alcohol injections into the trunks of the fifth nerve, given for temporary relief, were of no avail. He next went to St. Mark's Hospital for observation, where after a few days he was found to be suffering from encephalitis lethargica (sleeping sickness) to which he succumbed three weeks later. How futile the extraction of teeth in this case, only adding to the suffering the further sufferings of extractions.

#### THERAPEUTICS.

As to the therapeutics of "tic" I wish to state that it offers a very complex

situation. The underlying cause must be determined where possible and removed. The teeth should be thoroughly scaled and the gum margins disinfected, as I am convinced that very often we are dealing with an infective neuritis of the fifth nerve, caused by the absorption of toxins from pyorrheal pockets and infections around teeth. Where blind abscesses are discovered the removal of the offending teeth and surgical treatment of the sockets are indicated. The indiscriminate extraction of vital teeth must be condemned and constitutes nothing short of malpractice.

Where every effort has been made to ferret out the cause without any results, and where the case is of the so-called idiopathic variety, *i.e.*, one whose etiology cannot be determined, I have found injections of eighty per cent. alcohol directly into the trunk of the fifth nerve very effective, if not curative. The effect, however, is not lasting, three to six months being the time of relief after which another injection is indicated. I inject one to one and one-half cubic centimeters in almost the same manner as giving a conduction anesthesia.

If the pain is localized over the anterior part of the face, the upper lip, or the nose, I give an infra-orbital injection of eighty per cent. alcohol to which I add one novocain tablet "E." The immediate effects are very disconcerting, as there is a feeling of burning and tenseness over the face, followed by a marked swelling which, however, disappears in a few days. Where the pain is more over the temple and the head, I give both an infra-orbital and tuberosity injection. Where the pain is over the lower jaw and lower lip, I give a mandibular injection, distributing the alcohol in the mandibular fossa, using the same technique as in a mandibular anesthesia. Prompt relief follows this procedure.

The effects, as stated before, last from about three to six months, when the patient returns for another injection. In one case I have kept the patient free from pain by alcohol injections for over

three years. The patient had all teeth extracted for the relief of trifacial neuralgia, without any results. He was advised to have the Gasserian ganglion extirpated but refused. Alcoholic injections periodically every half year or so have kept him comfortable and able to attend to his business.

In closing I would like to state, that this article is in no way an effort to sup-

plement Dr. Russell's article in the April number, as he has covered the subject thoroughly from every possible angle. It is merely to emphasize what he has so ably presented, and with a view of cautioning the profession not to sacrifice teeth needlessly. It is a plea for the conservation of the patient and his teeth.

147 FOURTH AVE.

## Electric Modalities for the Treatment of Pyorrhea Alveolaris.

By Dr. A. A. NOUEL, Caracas, Venezuela.

(Read before the Northeastern Massachusetts Dental Society, June 15, 1920, Swampscott, Mass.)

IN introducing this subject it is not my purpose to develop a thesis, but to dwell upon the etiology of pyorrhea alveolaris because, while much has been written on the subject, still very little has been practically proved to sustain the various theories as to the real cause of this terrible affliction to humanity. Among the various theories on the subject, it seems to me that Dr. Percy Howe's and Dr. Rhein's are the most deserving of consideration.

Personally, I believe that pyorrhea alveolaris would not abound to such an alarming extent if the tissues in general were well nourished and proper hygienic measures were taken throughout childhood; if our organs of assimilation and elimination were kept in good healthy condition; if glandular activity were normal and if there were not a point of lowered resistance somewhere around the teeth caused by irritation as a consequence of accumulation of calcareous deposits, ill-fitted crowns, overlapping fillings, etc.

We very seldom find irritated gums in

children of good health with clean teeth which have received proper care from hygienists with the necessary co-operation of the parents, and only occasionally in children in good health who receive proper nourishment and adequate exercise, but who have not been taught how to keep their mouths in aseptic condition. On the other hand inflamed, congested and irritated gums are of frequent occurrence in mouths of poor, badly nourished children without sanitary training, proper exercise, etc. Why such a difference? On account of faulty local and impaired general metabolism, due to focal infections in some instances and, in the majority of cases, to improper nourishment.

Why is it that badly nourished children without the least notion of sanitary requirements do not succumb to a greater percentage? Because in childhood our organs are endowed with greater vitality, our defending army is better entrenched on account of natural exercise. Children are always jumping, shouting, running, etc., without having the remotest



idea that they are obeying the laws of Nature for keeping up their powers of resistance.

Nature is always repairing in one way or another the ills and errors of civilization, such as excessively late hours in theaters, clubs, etc., and excesses of all kinds tending to counteract her beneficial work of keeping our economy in good condition for defense. Nature releases our system from some of the many troubles resulting in most instances from our exacting fastidiousness in the preparation and condimentation of our meals and the perfection attained in our culinary art, which metaphorically speaking starts digestion before insalivation. Teeth, not being mechanically and automatically cleaned as required by Nature, are exposed to invading micro-organisms kept in close contact with them and glued on by mucin collected all around them.

Let me say here, regarding teeth brushing as taught by almost all dentists and hygienists, I am strongly against their techniques because I regard them as unscientific. You must be aware that calco-nuclein flows out in saliva when digestion starts and not before, and neither during mastication—only when digestion is in full activity—and I believe it begins an hour or an hour and a half after meals. If teeth are cleaned and brushed immediately after eating, their surfaces being free from highly subdivided food particles, it is to be supposed that calco-nuclein will afford a better adhering surface for calcareous deposits, while if they are protected by food smear, they will be relatively protected and calco-nuclein will act on a false foundation and consequently can be more easily brushed away. This is why I advise my patients to wash their mouths after meals, leaving brushing for an hour or two later. As an illustration, if we take a slab and paint it with syrup and afterwards pour varnish on it, it will be an easy matter to remove both by only washing and wiping; but if its surface is well cleaned and wiped and varnish is

poured on it, thorough cleaning will be much harder.

We should follow Nature a little more closely; otherwise all her efforts for sustaining us in good healthy condition will be in vain; and our economy in maturity will be staggered by the enormous strain of persistently invading micro-organisms, if not constantly checked, by injudicious nourishment without regard to its needs.

#### PYORRHEA DUE TO LOWERED RESISTANCE OF THE TISSUES.

It may be said without exaggeration, that whenever we find pyorrhea alveolaris there is invariably a lack of tonicity in the surrounding tissues and lowered general resistance coincidently; that accumulation of calcareous deposits, if present, may be due to this last pathological condition, and that these deposits are acting as local irritants tending to establish a faulty local metabolism and to prepare a fertile breeding field for further proliferation of different kinds of bacteria found in abundance in the mouth's flora.

I have always thought we were laying a little too much stress upon microbes. They are invariably found in pyorrhea pockets, it is true, and we must try to destroy them at any rate, but without leaving the tissues with lowered resistance or producing it by the unreasonable use of disinfectants, germicides or other irritants. We find in pyorrhea pockets a great variety of bacteria, as streptococci groups, fusiform bacilli, spirochaetæ, etc., besides amœbæ buccalis; but they are also found in healthy mouths, always prepared and ready to invade the weak spots of lowered resistance.

If you have a farm of vegetables with good guards to take care of the fences and your neighbor has another farm upon which he is rearing cattle, you may be sure that these animals will not destroy the fences nor eat the vegetables as long as the fences are well protected; but if there is a weak spot somewhere



or if the guards are negligent, the cattle will invade and destroy the plantation. If noticed in time, the cattle may be driven out or killed and the fences reinforced to prevent another attack. This is what we must try to do with our patients,—increase the strength of their fences, their natural resistance, and if bacteria find their way to some weak spot, we should pay special attention to that point of lowered resistance and reinforce it, disciplining the guards and constraining them to do their duty. If phagocytosis is properly induced, lymphocytes will take care of invading micro-organisms, destroying them and protecting the tissues from further attacks.

I have been treating pyorrhea for years, but I must confess that I have been unable to cure a single advanced case while following closely different techniques published in dental journals and using all kinds of drugs and preparations offered to the profession. After having paid due attention to the local aspect of the gums, I came to the conclusion that we could possibly check the disease if we could find some means for restoring normal tonicity to affected cells and if we could improve local metabolism without the use of strong germicides in order to interfere with bacteria proliferation.

I have made many experiments during my practice and today I am quite convinced that we will not be able to cure pyorrhea alveolaris if we do not promote phagocytosis; if we do not correct faulty local conditions and if general metabolism is not simultaneously improved.

We must not forget that almost any chemical used for arresting growth or for destroying micro-organisms is usually strong and irritating and that weak solutions do not actually act as germicides. According to what I have been reading lately, the only preparations which will sterilize pus pockets without interfering with the vitality of healthy cells are Carrel-Dakin's dichloramin solutions, Na-ozo, and Woolf's solution. I believe the last to be the best of all, and curiously enough, it is the least known and advertised.

I believe our mission must be rather to help than to supplant Nature in her efforts to restore health to affected tissues. We are using and introducing into our patients' systems drugs that certainly may and do act as specifics on special bacteria, but we are ignorant of the real micro-organism, the specific one responsible for this disease. Why do we not use more extensively chemicals found in abundance in animal tissues and fluids for washing pyorrhea pockets? Why do we not approach Nature a little more? Why not be her ally and not offer a substitute?

After having succinctly outlined my belief as to how pyorrhea is produced, how it would be possible to prevent and check it, I will give a description, with as many details as possible, of my actual method for curing this scourge of humanity, which has defied the patience and knowledge of so many highly trained, scientific minds. Before doing so, however, I want to emphasize the fact that my method is by no means a tissue-builder; that broken-down tissues are simply healed; that their former size and shape will in no way be restored; that in far advanced cases, where the alveolar process is almost destroyed, treatment should not be instituted, and that the operator's judgment should be the best guide in advising treatment or avulsion.

#### AUTHOR'S METHOD OF TREATING PYORRHEA.

The first very important step is the removal of all calcareous deposits from the cervix and around the root, as far as detected by suitable probes, with special scalers with high-cutting edge, but without serrations in order to avoid scratching the surfaces, which must be carefully polished, especially at the cervix. This is a technical operation well known to all practitioners, so I need not extend any description as to its performance.

The next step is to wash away debris or loose calcareous deposits, pus and coagulum from the pockets with physio-

logic salt solution. Sodium chlorid is freely distributed in our system and I believe that if not used in a too concentrated solution, its action will not be irritating and living cells will in no way be disturbed. Its mild antiseptic properties highly recommend its use. (After having used Woolf's solution, I should advise a two per cent. solution instead.)

We have now to deal with abnormal tissues of lowered resistance and that is just what I want to impress upon your minds. We must, by all possible means, try to aid Nature in her persistent work

close contact with the surface and as nearly equidistant as possible from the place to be treated. Now, as we do not have electrodes for promoting hyperemia on the periapical structures, I devised a special one consisting of two movable bowed limbs with a thick insulating ring at the joints. The terminals, near the joints, are to be attached to the leads of the machine and the free ends of the long limbs are cup-shaped for receiving small wet cotton pellets, which should be kept in actual contact with the surfaces to be treated in order to avoid

FIG. 1.



FIG. 2.



of restoration without the use of strong, irritating antiseptics or germicides, which largely retard the return of the living cells' tonicity. This is obtained by promoting phagocytosis in order to improve local metabolism in a given area.

We know that whenever we are able to induce profound hyperemia, local stasis is overcome, and phagocytosis sets in. There is an increase of blood supply to that special spot and hyperemia may last very long, twenty-four hours or more if we promote it by means of diathermy in preference to convective heat. This electrical modality is a high frequency current of relatively high amperage and low voltage; *i.e.*, direct d'Arsonval current.

Ordinarily two electrodes are used in

sparkling and to reduce, though very little, the resistance to the passage of the current. For the sake of convenience and in order to cover any surface desired, I devised a second plate electrode, consisting of a rubber plate enveloping the diseased gums on both sides and including the teeth. (This is an individual electrode.) Inside and on the surface covering the gums a little distant from the cervix of the teeth, there is a tin foil with a terminal soldered on and traversing the rubber sheet on one side; on the other side there is a similar arrangement. After all, it is a simple improvement of my former double-pole electrode with the advantage of being easier to keep *in situ*. (See Figs. 1 and 2.)



With regard to the effects of this electrical modality, I should say that both sides of the gums become very hot and that hyperemia promoted in this way lasts from twenty-four to forty-eight hours, all depending on the strength of the current used and on the time of application. There is almost no resistance to the passage of the current from one of the electrodes to the other, and the only sensation experienced, besides a very slight, nearly imperceptible tingling, is gradual increase of warmth.

#### APPLICATION OF THE CURRENT.

The current must be turned on at the lowest reading and increased gradually in order to avoid overheating the surfaces beyond the point of tolerance, otherwise deep-seated structures will not be reached and heated sufficiently so as to become hyperemic, and this is the most important part of the technique. I have kept record of the heat evolved, and 104° F. is almost always tolerated. I do not think it advisable to go beyond this limit, because electro-coagulation may result. In my latest observations I have found that there is still an easier way for administering high-frequency currents, namely, from an Oudin resonator. This current is of higher voltage and lower amperage, all faradic sensation being entirely cut off, and it is not necessary to keep the unipolar electrode in actual contact with the gums.

The patient being insulated, with his hands on his lap, the operator holds a handle with a grounded metallic electrode in close contact with the opposite side upon which the application is to be made. The other electrode must be a pointed one and is intended to be connected to the Oudin resonator. It is held at a short distance from the gums, which are to be fulgurated at short intervals and at different spots between each interval and covering a slightly larger surface than the affected part. With this modality the temperature increases much slower than with the former method mentioned. The same

technique holds good for the opposite side.

Ordinarily all pus-oozing subsides after the third or fourth application, given at intervals of from two to three or four days.

Now, as the ligaments or fibers of Sharpey may be separated from the cementum or destroyed to a certain extent, and as we have no mechanical means for impeding entrance of food débris in the pockets, I use the same electrical modality from an Oudin resonator for the purpose of promoting constriction of the gums around the cervix of the tooth. A pointed metallic electrode is to be used. After being sure not to have a spark longer than three millimeters and rather thin, the gums are to be fulgurated from a distance of two millimeters, without intervals, and following the outline of the gum margins, being careful not to allow the sparks to jump to the cervix of the tooth, because it is very disagreeable.

After the gums are healed we will notice a regular ring around the collar of the tooth.

This may be considered as half of my method for curing pyorrhea. We have taken care of local conditions.

#### SYSTEMIC TREATMENT.

The most important thing now is to institute a proper diet and to inquire about the patient's health, which may be impaired on account of constant pus-swallowing and because of immigration of some of the bacteria groups present in pyorrhea pockets, or elsewhere in the mouth, which may find a proper field as the result of improper or deficient nourishment.

If the sphygmomanometer shows hypertension without due compensation, the blood pressure should be lowered and a special record filed for each individual case. Auto-condensation meets very well the demands for lowering high blood pressure, the dose of 500 to 600 milliamperes being fairly suited for average cases. It is a well established fact that auto-condensation or auto-conduction



will increase general metabolism, temperature, bodily heat, oxidation, secretion, elimination, etc., which may be interpreted as expressions of increased resistance and as suitable aids to proper nourishment.

The temperature of the forearm rises from two to four degrees above normal and in the mouth from one-half to three-quarters of a degree (Centigrade). Urine tests show increased solids after the second or third general application. The sweat glands increase in activity and are stimulated to such an extent that some patients' clothing becomes thoroughly wet. I do not know if auto-vaccine means as much as is claimed for it in pyorrhea treatment. I am not in position to discuss this matter because I have not given it a thorough test, but at any rate, I advise my patients not to dry the body nor change their clothing because it may be possible that reabsorbed sweat might act as an antibody. The application of the current is of ten minutes' duration daily during the first week; at intervals of one day for the second week; and twice weekly for the third and fourth weeks.

If the existing condition is one of hypo- instead of hypertension, sparks on the spine will prove very beneficial, because stimulation is prompted and possibly impaired metabolism may be corrected. At any rate, arterial tension rises and a normal blood pressure may be re-established. Since, when employing auto-condensation the patient is acting as one of the coatings of a condenser, I believe with Dr. Eberhart, that what is really happening is a cellular massage, because the body is charged and discharged millions of times a second.

If general treatment is to be administered, regardless of arterial tension, with the object of correcting impaired

general metabolism, both auto-condensation and sparks along the spine are to be used on alternating days in order to raise and lower arterial tension without impairing it if found normal.

With auto-condensation and especially with this combination, I have noticed something which substantiates the cellular massage theory and proves that it may be enormously beneficial to nerve centers. An effect not mentioned by any author as far as I know, but one invariably observed by all my patients is that sexual stimulus is greatly enhanced even in people who have lost almost all virility, and it seems to be of a more or less permanent character. This, I find, is a very important indication that assimilation and elimination are greatly improved and that nerve centers are better nourished, possibly due to slight, general phagocytosis promoted by the heat evolved during general massage at each charge and discharge of the system.

I believe that to attempt to cure pyorrhea alveolaris without instituting proper diet, at the same time devoting earnest efforts towards improving the patient's general metabolism, is illogical, and means nothing else than a retrogression to the old and discredited system of ignoring Nature and using strong, powerful, cell-injuring germicides, a method so thoroughly tried out and found wanting. Disinfectants, if not very mild, ordinarily destroy pericementum and the alveolar process to a certain extent and maintain the gums and periapical tissues in a state of constant lowered resistance, interfering seriously with cell tonicity and with general health, thus constituting a hindrance rather than a help in the radical cure of this distressing ailment.

This is not a trite argument, it is simply a statement of fact.

## Perfection in Lower Impression Dependent Entirely on Knowledge of Parts and Manipulation.

By ALEXANDER H. PATERSON, D.D.S.

UNIVERSITY OF MARYLAND, DENTAL DEPARTMENT, BALTIMORE, MD.

(Read before the Pennsylvania State Dental Society, at its annual meeting, held in Reading, April 27 to 29, 1920.)

### ORIGIN OF THE THEORY.

SOME men are contending that Hall did not originate the underlying and basic theory upon which this paper is to rest, but that others, before his day and time, had evolved theories and a technique which in many respects resembled those he has stressed as being the groundwork of his system. Be that as it may, it, nevertheless, is true that through his persistent adherence to the basic idea, whatever its original source, Hall focused attention on the principles on which the theory is based in such a manner as to attract adherents to the cause, and resulted in giving him credit for the development of a system which has worked wonders for the profession and the public.

The fundamental idea on which Hall began his work, and later developed a perfected system of impression taking, was founded on the single basic thought of getting an impression of the mouth without distortion or displacement of the surrounding soft tissues whatsoever. In other words, to so manipulate the impression material that all available space, and no more, shall be copied and utilized in forming a base for the future denture.

This is the sole and unvarying foundation on which the system is built, and, while due and generous credit should be accorded to other men of inventive turn of mind who have contributed to

the development of the system in many practical ways, it must be admitted that, without Hall's forceful leadership and the enthusiasm he was able to arouse in the system, it is doubtful if the systematic and orderly procedure in vogue would have been developed.

### DEVELOPMENT OF THEORY.

Early in the development of the theory, it was discovered that, in order to bring into realization the perfect impression which the basic thought pictured, it was necessary to study the mouth and its contained parts from an advanced and more scientific standpoint than that hitherto regarded and accepted by the profession generally as being complete.

It was also recognized that it required a more careful study of the preparation and behavior of the materials popular at that time and in general use in taking impressions, as well as the origination of a new material, possessing definite and necessary properties and capable of being readily adapted to the parts, easily trimmed to requirements, and later employed to carry the plaster in completing the impression.

The recognition of these needs, together with an unfaltering faith in the basic idea, inspired other men of like talents to aid in the search for the ideal in this branch of dentistry. Primary efforts often led to failure; succeeding ones showed improvement, and even par-



tial success; while later the perfected system was finally worked out and successfully established.

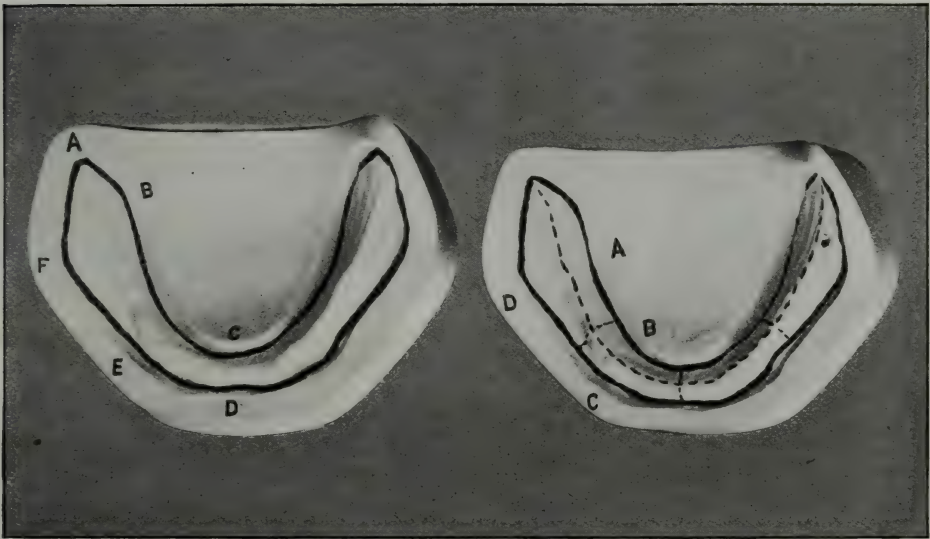
It must not be presumed that these objects were easily obtainable. On the contrary, they demanded much careful study, great labor and tedious experimentation on the part of the men engaged in the work. Their combined efforts have resulted in a logical procedure and an exact scientific technique now to be described.

mylo-hyoideus muscle to the mylo-hyoid ridge, or possibly a little beyond, if the tone of the muscle will permit (Fig. 1, B). Rounding this point, continue the line forward at an angle varying in degree to the line just described, and following the full extent of the mylo-hyoideus attachment to the frenum linguæ at the symphysis of the jaw (Fig. 1, C).

Returning again to the point of beginning (Fig. 1, A), extend a line buc-

FIG. 1.

FIG. 2.



The following is meant to be an orderly and progressive technique called for by the system under discussion.

#### PERFECTION OF THEORY. EXAMINATION IN DETAIL.

##### A. Establishing the Base Outline.

Posterior to the location of the last molar tooth, directly in line with the crest of the alveolar ridge and well up on the movable soft pad of tissue usually found in that region, locate a point of beginning (Fig. 1, A). From this point extend an imaginary line lingually forward and downward to a point located near the posterior attachment of the

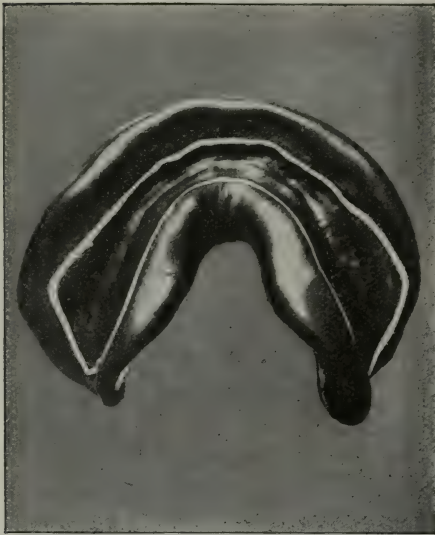
cally forward and downward, with a greater inclination forward than the line extended lingually from the point of beginning. The line follows the fold of mucous membrane as it leaves the surface of the bone and passes up into the cheek. This tissue fold is a natural sequence, due to the arrangement of the tissues covering the angle of the jaw. The extent of the tissue attachment varies, but is usually from a half to an inch or more in length. At the terminus of this fold establish a point (Fig. 1, F), and from it continue the line forward, upward and inward, again following the fold of the mucous membrane along the horizontal portion of the mandible to the



attachment of the buccinator muscle on the alveolar process (Fig. 1, E). Leaving this point, the line usually takes a sharp decline and continues on to the center of the jaw with little or no variation (Fig. 1, D).

The outline both lingually and buccally follows the same general direction as the crest of the alveolar ridge, and is influenced in its regularity throughout its whole extent by reabsorption of the

FIG. 3.



process and the position of the surrounding tissues.

#### B. Sub-dividing the Base.

From the point of beginning established in describing the base outline (Fig. 1, A) we divide the base longitudinally by extending a line forward to a corresponding point on the opposite side of the jaw, using the crest of the alveolar ridge as our guide in locating the direction.

We cross-section the base by joining the lingual and labial borders of the outline at the center of the jaw, and again in the region of the bicuspid teeth. The result of this division is the formation of eight separate sections: posterior lin-

gual (Fig. 2, A) right and left; anterior lingual (Fig. 2, B) right and left; labial (Fig. 2, C) right and left; buccal (Fig. 2, D) right and left.

Like the base outline each of these sections is influenced in size and shape by the reabsorption of the process and location of the surrounding tissues, and a careful study of each section is the system we employ in correctly estimating the extent of surface to be covered by the base.

As an illustration of the procedure followed in sectional examination we will examine in detail the right posterior lingual section.

First, estimate the distance of the posterior lingual border from the original point of beginning in establishing the base outline to the attachment of the mylo-hyoideus muscle to the mylo-hyoid ridge. Second, the distance from this border to the divisional line in the region of the bicuspid teeth. Third, examine the regularity of the lingual border, compare its direction to the crest of the alveolar ridge, and estimate the variation in distance between the two throughout their whole extent. Fourth, locate prominences and other irregularities on the surface of the base section which may be utilized in the later study and technique of trimming the tray.

#### DESIGNING THE TRAY.

Having formed a mental picture of the whole surface to be utilized in perfecting the impression from estimating the extent of the base outline and the systematic examination of the sections, we proceed to accomplish its development by persistently adhering to a definite order of procedure and a scientific manipulation of the materials accepted as being ideal for the purpose.

An impression of the mouth is taken with the S. S. White tray compound (Fig. 3), very much in the same manner as we would employ any of the old-fashioned modeling compounds, and from this impression a tray is designed to approximate in every detail all the requirements found in the examination.

In designing the tray, first determine roughly the outline by trimming the compound to correspond as near as pos-

sible to the imaginary outline established in the mouth (Figs. 3, 4). Then trim and contour its upper surface to take

care of the excess plaster and to accommodate the probable position the surrounding tissues will assume after the

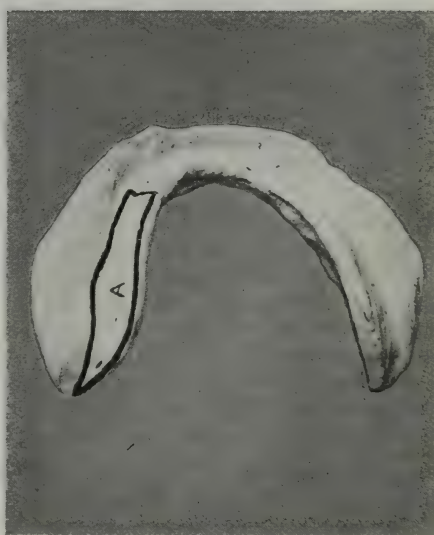
FIG. 4.

FIG. 5.



FIG. 6.

FIG. 7.



sible to the imaginary outline established in the mouth (Figs. 3, 4). Then trim and contour its upper surface to take

tray is seated in the act of taking the impression (Fig. 5). The importance of arranging on the surface of the tray

concavities into which the surrounding tissues adjust themselves is to avoid any possibility of strain with resultant inaccuracy of the peripheral border, as frequently occurs when this important detail has been given little or no consideration.

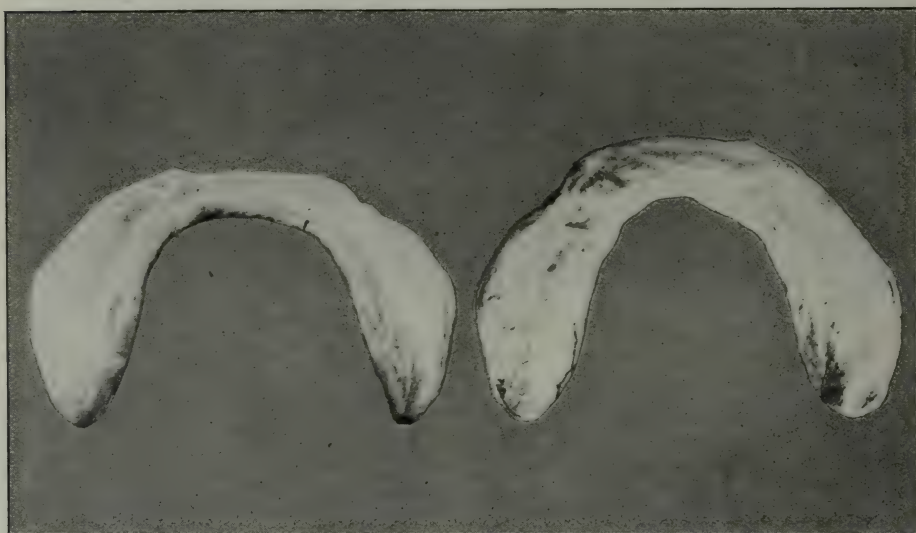
The final trimming of the peripheral border to correctly establish the exact dimensions of the tray's base, according to the mental picture suggested by the detailed examination, is accomplished by

prepared tray depends entirely upon one's ability to determine the proper consistence of the plaster.

The demand is that it shall be a uniform, free-flowing mix, and no set rule can be given to insure immediate results in performing the technique. Experience in handling plaster and a study of its behavior during the process of manipulation are the means by which a full appreciation of the ideal is acquired. The quick-setting plasters reach the de-

FIG. 8.

FIG. 9.



following the same order of procedure as we observed in estimating the extent of the corresponding surface in the mouth. Sections are marked off on the surface of the tray (Fig. 6, A) and compared as to size and regularity by frequent tests of accuracy in the mouth (Fig. 2, A) as the trimming proceeds. Fig. 7, A shows correctness of estimated distance on the finished plaster impression.

#### PLASTER MANIPULATION.

Success in perfecting the principles of the basic thought by the use of a plaster finish to the base of the scientifically

sired consistence immediately before, and the slow-setting immediately after, the hardening process begins.

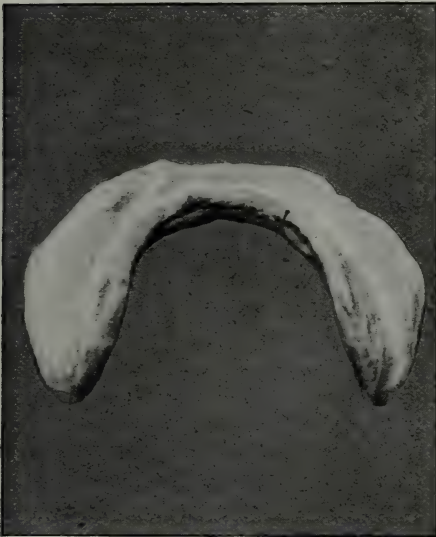
In performing the technique in taking the impression the patient is seated low in the chair. The tray laden with the desired amount of plaster is introduced into the mouth, and by dexterous use of the fingers both it and the surrounding tissues are controlled in such a manner as to give the widest possible view of the surface to be covered, and the least interference of the tissues in placing the tray over the center of the ridge.

The tray is then firmly seated in position, the tongue raised, brought forward



and allowed to remain at rest. The cheeks and lips are released, the mouth

FIG. 10.



closed and the surrounding tissues automatically assume the positions prepared

for them on the upper surface of the tray, pushing and molding the plaster as this action occurs (Figs. 8, 9).

The slower technique, the one so beautifully executed by its greatest exponent, Dr. M. M. House, differs slightly from this one in the design of the tray and the necessity of muscle manipulation.

#### THE FINISHED IMPRESSION.

The perfect impression is an exact reproduction of the surface of the mouth utilized in forming a base for the denture, and to be of any value in carrying out the purpose for which it was developed, one must be able from a careful study of its surface to judge its correctness, otherwise nothing has been gained, and you would proceed with your work with no more assurance of success than when following the careless unscientific methods of the past.

COMMONWEALTH BANK BLDG.

[See also *Discussion*, as reported under "Proceedings of Societies," this issue.]

## Vincent's Angina: Case Reports.

By BENNETT A. FELDMAN, D.D.S., New York City,

CHIEF OF CLINIC, DENTAL DEPARTMENT, LINCOLN HOSPITAL, NEW YORK CITY; LATE DENTAL SURGEON, U. S. ARMY.

**I**NASMUCH as this disease has aroused so much interest in the profession of late, the writer wishes to present the following cases from his own experience, for by constant repetition and reiteration only will the importance of its early detection and prompt treatment be firmly impressed upon the mind.

The first case cited came under my observation recently at Lincoln Hospital, and proves that age is not to be considered as a factor in this disease, but that this condition may be found in very

young children as well as in adults. It demonstrates also, that the general state of health of the individual, and the greatly lowered resistance resulting from serious illness, as well as an unclean condition of the mouth, may be cited as the predisposing causes in the development of Vincent's angina.

#### CASE 1.

Patient, age five, male. In convalescent state, having recently recovered

from a condition of broncho-pneumonia, with complication of measles. Wassermann test showed ++ positive. When admitted to the hospital originally, his teeth and gums were in fairly good condition. The case was referred to the dental department by the visiting staff, patient complaining of pain and soreness in the gums, which bled quite freely at the slightest irritation. Examination of the mouth showed the formation of white linear scar tissue on the soft palate, which on removal left a raw and bleeding surface. The buccal mucous membrane was very much inflamed and congested, and the gingival margins of the gums on the labial and lingual surfaces showed extensive ulceration, raw and bleeding surfaces. The submaxillary and sublingual glands were enlarged, the breath was offensive, and there was an increased amount of thick,ropy saliva. Temperature 102°. Laboratory report of smear taken from ulcerating surface showed the presence of Vincent's spirillum and *B. fusiformis* in large numbers. Several teeth were lost as a result of the rapid progress of the disease before the patient was referred to our department.

Treatment was immediately commenced. The condition was checked in about two weeks' time, and the case cleared up in about four weeks. The usual treatment indicated consists of thorough and careful prophylaxis, to be followed by a spray of an antiseptic mouthwash (warm), or peroxid and water, so as to wash out all the food particles and debris from the interproximal spaces. Then apply solution of argyrol—25 per cent. Prescribe mouthwash of potassium permanganate, to be used very frequently by the patient. The writer has found that the use of a spray of Dakin's water solution and the spray of a 2 per cent. oil solution of dichloramin-T, employed several times daily, have proved of great value in the treatment of this condition. The reader is again reminded at this time that the

disease is contagious and may be communicated to other members of the family if proper precautions are not employed.

#### CASE 2.

Patient, age twenty-six, male. Had recently recovered from an attack of tonsillitis. Complained of pain and soreness of the gums in the region of the upper right and left centrals, and left lateral. Examination of the mouth revealed the characteristic ulceration of the interproximal gum tissue. A smear was taken, the laboratory report of which was positive for Vincent's spirillum and *B. fusiformis*. The patient was ordered to report back to the clinic the following day, but failed to do so. Seeking immediate cure of the condition, he was very easily persuaded by a dentist that the extraction of the two healthy central incisors would accomplish that result. When he reported back to the clinic a week later, it was found that as a result of the extractions and the neglect of treatment the condition had been greatly aggravated and had spread over the entire buccal cavity.

This case shows how easily the condition may be overlooked when one is unfamiliar with its clinical symptoms. It is the writer's hope that the lessons inculcated from the experiences of prominent men in the profession as a result of their study and treatment of this disease, and the constant publication of reports and discussions of such cases, will result in awakening dentists to the realization of the importance of early recognition and prompt treatment of these cases in their incipency. Failure to do so will leave in its wake results disastrous to the teeth and surrounding tissues and a fertile ground for the development of pyorrhea alveolaris and necrosis. When in doubt, it is always best to be on the safe side by taking a smear of the suspected area for a bacteriological examination.

601 WEST 136TH ST.



# The Etiology of Successes and Failures in Treating Systemic Diseases on a Basis of Focal Infection.

By ALBERT M. CRANCE, M.D.

FROM THE DEPARTMENT OF SURGICAL DIAGNOSIS, JONES CLINIC, BAY CITY, MICH.

WHEN such a vital, scientific and important subject as focal infection becomes a joke not only among the laity but among certain physicians and dentists as well, it is high time for the medical and dental professions to call a halt, and investigate into the "pros" and "cons" from an unbiased point of view.

From the medical side, we have the overenthusiastic physician, who, before having carefully examined his patient, sends him to the dentist for the so-called "wholesale extraction." In many instances there have been high hopes of success. The patient does not improve, and naturally after a series of several similar examples the physician's belief in focal infection becomes rather skeptical, and it so continues until he terms it a "joke." The patient also joins this force of "antis" and goes about his community saying: "They pulled out all my teeth, and it hasn't helped me one bit." In many instances too, the dentist, if he has watched the case, joins the force also.

From the dental side, we have the overenthusiastic dentist, who without any medical history or examination of the case whatever extracts the teeth in the hope of relieving the patient's symptoms. He also soon finds himself becoming rather skeptical. Later he decides that he is opposed to the focal infection theory.

One would naturally think that focal infection was the cause of every disease recorded in the pages of medical literature, and that the extraction of teeth

was a specific treatment for every disease with the exception perhaps of syphilis and gonorrhea. When quinin was discovered to be specific for malaria, did we expect to cure every known disease by administering it? When salvarsan was discovered to be specific for lues, did we expect such great things of it? No, indeed! Then why should we expect so many conditions to respond to the removal of teeth?

There is a great difference between the removal of teeth and the removal of foci. In many cases teeth are extracted regardless of a correct X-ray interpretation or any consideration whatsoever, and in a large percentage the teeth are not foci of infection. Just why it should be looked upon in such a narrow way is certainly a problem. It is perfectly evident, therefore, that we must outline some method wherein focal infection has proved successful as well as to point out reasons for failures. In such a manner, we may possibly be able to save this valuable adjunct to science from "going on the rocks."

The first point toward success lies with the physician. He is the first, usually, to whom the patient goes. It is his duty to take a careful history of the case and to examine the individual thoroughly from head to foot. Then, after the necessary tests are made, let him refer each and every case to the dentist, who in turn radiographs the suspected teeth and takes care of what dental advice is needed. There is one thing which is absolutely wrong, that is, for the physician when referring a case to



the dentist to state which teeth are to be extracted.

The dentist's judgment should be far superior to the physician's in deciding which teeth are foci of infection. Also, it is not the duty of the physician to X-ray the teeth and determine which ones are abscessed. That is the duty of the dentist, and the physician should leave it to him. However, in this connection, it is not expected that the physician will refer cases to the dentist who does not know a focal infection when he sees it. If the dentist himself is carrying on the practice of devitalizing teeth, and putting bridges on abscessed teeth, he is not the proper man to whom to refer cases.

The next important point is co-operation between the physician and dentist. At this clinic, every patient, after a complete history has been taken, and a complete physical examination made, is sent to the dental department for dental examination. This has become a routine procedure, which has proved of utmost value. I cite this as an example of co-operation between the two professions.

The third essential factor lies in the dentist's ability to differentiate focal conditions from other conditions. It is essential that he know the complete history and the physical findings in the case, so that he can intelligently give a differential diagnosis. Dentistry is a branch of medicine; especially now do we realize that fact. If the physician refers cases to the ear, nose and throat, eye, genito-urinary, orthopedic or other departments we expect a diagnosis of at least differential value. Why should there not be the same sentiment between physician and dentist?

The fourth important factor toward attaining success lies in conservatism on both sides. Neither the physician nor the dentist should be too enthusiastic if a focus of infection is found, and expect

a miracle to be performed. If abscessed teeth are present they certainly should be extracted for the benefit of the patient's health, nevertheless the patient's symptoms may be due to an entirely different cause. In such cases it should be explained to the patient that relief will not necessarily follow the extraction, but that it is a prophylactic measure. Sound judgment in a careful differential diagnosis is of paramount importance. There are many other conditions which may simulate the pains due to focal infection. Reed\* of this clinic has gone into the subject of differential diagnosis very thoroughly, and indeed his paper explains clearly why so many failures in treating disease have been erroneously attributed to focal infection.

In conclusion, the reasons for successes lie in a close co-operation between the two professions; routine dental diagnosis, and, lastly, conservative opinions from both sides as to what is promised the patient. The cause of failures can best be explained by too much over-enthusiasm, radicalism and a lack of any of the above four conclusions.

Indeed is the medical profession "up against it" as is the dental, and they both see the need of reform. Many of our leading medical colleges are graduating men who never saw a dental film, and who know nothing of focal infection. On the other hand, many of our leading dental colleges are graduating men who know nothing of medical diagnosis. Both are essential for success, and unless something is done to remedy these faults, focal infection will not reach the place of distinction in medical science which it so justly deserves.

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\* RAY R. REED, D.D.S. "The Necessity of a Knowledge of Differential Diagnosis in the Therapeutics of Focal Infection." DENTAL COSMOS, July 1920, p. 840.

## Surgery in Plate Making.

By G. D. LAYMON, D.D.S., Miami, Fla.

**H**AVE you ever spent two hours in taking a muscle-trimmed impression; and after the plate was completed did the patient tell you that it would not stay in place?

Instead of spending hours in impression taking, thirty minutes of surgery will "do the trick," and will do it far better.

The operation I shall describe must not be confused with a mere clipping of the muscles. It includes this, but also much more. It is not to be used in all cases, of course, but only when the alveolar process is so far absorbed, and the muscles from the maxilla to the lips are so strong, that plates made from ordinary impressions will not stay in place.

In this article we shall consider the surgical preparation for upper plates only; that for lower plates will be taken up in a later contribution.

First, the whole mouth is washed with an antiseptic solution, and the buccal surface of the maxilla painted with tincture of iodine. This whole surface is then anesthetized by a series of infiltrations with novocain and adrenalin.

With a small, sharp knife a cut is then made clear around the bucco-labial surface of the maxilla, about a quarter of an inch above the alveolar border, cutting through the full thickness of the mucous membrane. This cut should be made at *right angles* to the surface—a single clean cut from one end to the other.

Then upward tension is made on the mucous membrane with the finger tips of one hand while this membrane is dissected back from the cut. The knife is held at right angles to the surface, and by

a series of short, delicate cuts the membrane is loosened from the underlying gingivæ. The dissection is carried upward from a quarter to half an inch, depending upon the configuration of the maxilla, until the dentist is sure he has enough surface to hold a plate.

During the course of the dissection the muscular attachments at the frenum, in the canine fossæ and in other places are cut away. This obviates completely any danger of the plate being thrown down by muscular contraction.

A plaster impression is now taken, and a vulcanite base is made immediately. The edges of this base are made high, so as to hold the mucous membrane out of the denuded area and prevent re-attachment of the muscles. This temporary base is worn continuously from the day of the operation until the denuded surface is healed.

The matter of asepsis is important. The base must be removed after each meal and at bedtime, and the mouth washed thoroughly. We prefer Dakin's solution, one per cent. strength. This can be prepared from tablets furnished by several drug houses.

The healing process occupies two weeks, more or less. Little spots of necrosis may occur. These may be touched with iodine or other antiseptic. They rarely give any serious trouble.

At the end of this period the raw surface has healed, and the flap of mucous membrane has shrunk to practically nothing. Another impression is then taken and a permanent plate made. The result has so far been uniformly satisfactory.

It is in these cases that we are often bothered by a spongy condition of the

gums. The usual method among plate makers is to allow for the compression and relaxation of this tissue, which is an uncertain and unsatisfactory guess. A better way is to take a sharp knife and slice it down to a proper level, much as a horse's hoof is pared down before putting on the shoe. There is neither trouble nor danger in the operation. With a little Dakin's solution it heals as well as any other wound, and the plate fits perfectly.

The main point is for the dentist to remember that he may use other instru-

ments besides the forceps. He is a Doctor of Dental Surgery. In the operation above described, preparing the maxillæ for an upper plate, the mucous membrane can be dissected back and the attachments of the muscles cut through with the greatest ease. The temporary base preserves the advantage until the denuded surface heals over. Then a perfectly fitting plate can be made from an ordinary impression. It obviates all muscle trimming, which is both laborious and uncertain, and gives success in cases which otherwise are hopeless.

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## Conservative Methods in the Use of Nitrous Oxid and Oxygen Anesthesia.

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By D. O. HENSON, D.D.S., Philadelphia, Pa.

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NITROUS oxid and oxygen anesthesia for the general practitioner of dentistry is invaluable in the hands of the experienced operator. The day has passed when we can class the administration of this agent as a so-called fad, as many men can testify who have been using this method for a number of years.

By conservative methods it is necessary to speak of the practical history, the administration of nitrous oxid and oxygen for cavity preparation, removal of pulps, and to mention some of the things to be avoided and reasons for failures which in many instances can be avoided.

Let us consider the brief practical history of this agent. Some years ago nitrous oxid and oxygen anesthesia was extensively advertised all over the United States. Demonstrations were given by experienced and inexperienced clinicians and analgesia was the chief topic of discussion.

Analgesia, as we all know, is the first

stage of anesthesia in which the subject anesthetized remains in a semi-conscious condition and oblivious to pain. These demonstrations were conducted in many instances on favorable subjects and many pleasing minor operations such as preparing sensitive cavities, removing pulps of teeth, etc., were completed with good results, but the reason why the method failed for many men who bought machines was because of the fact that they depended too much on the machine to do all the work, forgetting that the administration of nitrous oxid and oxygen demands unlimited experience upon the part of the operator, and that analgesia could not be induced in each and every patient with an equal degree of success.

### SELECTION OF PATIENTS AND CAVITY PREPARATION.

First of all we will say, for example, a patient comes to us for the first time with a history of hypersensitive teeth and a desire to avoid any pain, provid-



ing it is possible to administer some agent to prevent this condition. Let us suppose a patient has a number of cavities, and in such instances I think it is wise to prepare the smallest and least sensitive cavity first without an anesthetic. In doing this we accomplish two things, one being to gain the confidence of our patient, the other to make them realize it is not necessary to use an anesthetic for every cavity to be prepared.

We then come to the sensitive cavities and if we find a condition of hypersensitive dentin it is best to break down the frail walls with sharp chisels and remove all the soft decay with the exception of that part which is deep-seated and nearest to the pulp. We then administer nitrous oxid and oxygen preferably with a nose-piece and at this time we are able to determine if we need analgesia or complete anesthesia.

The patient is anesthetized and the undercuts and retaining pits are made and the decay nearest the pulp is gently removed. Preparing the part of the cavity which is not sensitive before administering the anesthetic is in my estimation the first step to insure success for several reasons: one, because it lessens the period of anesthesia, which means less strain on the patient; another, it allows the operator the least possible amount of work on each tooth; and, last but not least, if complete anesthesia is necessary and the patient proves unruly, the operation can generally be completed before the patient spoils the whole procedure.

#### THE REMOVAL OF CONGESTED PULPS.

A tooth that has a badly congested pulp with severe pulpitis is indeed difficult to handle without a general anesthetic. In such cases it is best to administer complete anesthesia and drill down into the pulp chamber and remove as much of the pulp as possible during the short duration of complete anesthesia (not prolonged anesthesia). That being accomplished, providing we are "reasonably sure" there is no infection, the remaining filaments can be removed under pressure anesthesia without pain.

I believe this method is far more sensible than to keep the patient anesthetized for a long period of time and, too, because the longer the patient is under the anesthetic, the more trouble we are likely to have.

#### REASONS FOR FAILURES AND SOME THINGS TO BE AVOIDED.

We must realize that nitrous oxid and oxygen cannot be given to every patient for some reasons not necessary to mention in this writing, but to the experienced anesthetist a study of each case can be made and a general history taken in a manner which will not cause unnecessary apprehension or fear on the part of the patient.

We meet individuals who have taken some anesthetic, such as ether, chloroform or nitrous oxid and oxygen, and when the general history and diagnosis of conditions are thoroughly gone over, we sometimes learn of some previous occasion where the patient has fought an anesthetic, proving in the majority of cases the inability to take a general anesthetic of any kind. Such cases should be handled with conduction anesthesia because once a patient proves unruly it is best to accomplish our purpose in some other way.

A very good method to insure against trouble is to use a strap which the assistant can place around the patient, preferably around the chest and under the arms. This can be accomplished as the patient is beginning to take the anesthetic in a comfortable manner. Another necessary thing to consider is the necessity of a good machine, preferably S. S. White or Heidbrink, both of which have a definite control of nitrous oxid and oxygen. Also I believe the electrical device for heating the mixture is indeed beneficial in many respects, especially with those afflicted with pulmonary troubles of any kind.

It has been my experience, before I considered warming the mixture to body temperature necessary, to have patients return the next day with colds. Therefore I think the proper warming of the

gases is very beneficial and indeed much more comfortable and safer to the patient.

The number of patients who cannot take this agent is reduced to a very small percentage, but, like other good things, this method of relieving pain has its place in the practice of dentistry, but is not a cure-all and used in a conservative manner is the safest and one of the

most useful methods of relieving pain we have today.

In conclusion, I would say that nitrous oxid and oxygen has many advantages over conduction and infiltration anesthesia, one being the saving of time, and another the percentage of failures will be far less than in the use of the other forms of anesthesia just mentioned.

4837 GERMANTOWN AVE.

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## CORRESPONDENCE

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### "A Case of Necrosis of the Mandible."

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TO THE EDITOR OF THE DENTAL COSMOS:

Sir,—Referring to "A Case of Necrosis of the Mandible," published in the DENTAL COSMOS for February 1920, I fully agree with the comments made by Dr. Miller, published in the DENTAL COSMOS for May 1920. Necrosis was very probably there before the tooth was extracted. I have an exactly similar case at present.

Patient, Miss K., had abscess on upper second bicuspid. Entire right side of face swollen. Patient sought no relief. Swelling subsided. Two months later, patient came to me. I extracted the tooth and found extensive necrosis with empyema.

Very truly yours,  
WILLIAM SCHEER, D.D.S.

NEW YORK, N. Y.

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# PROCEEDINGS OF SOCIETIES

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## Dental Society of the State of New York.

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Fifty-second Annual Meeting, held at Albany, N. Y., May 13, 14, and 15, 1920

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THE fifty-second annual meeting of the Dental Society of the State of New York was held at Albany, N. Y., on Thursday, Friday, and Saturday, May 13, 14, and 15, 1920.

The meeting was called to order at 10.30 o'clock Thursday morning, in the grand ballroom of the Hotel Ten Eyck, by the president, Dr. Horace P. Gould of Brooklyn.

Rev. Rolif H. Brooks invoked the divine blessing upon the deliberations of the society.

The PRESIDENT. I have now the honor to present to you Hon. James R. Watt, mayor of Albany, who wishes to welcome the members.

### Address of Welcome.

By Hon. JAMES R. WATT, Mayor of Albany.

*Mr. President, ladies and gentlemen.* It is certainly a pleasure to be invited to come here this morning to extend to you the courtesies of the city. I consider it quite an honor to be classed as the first mayor who has been so honored by this association. The city of Albany, as many of you know, is the second oldest city in the United States. In fact, it is the oldest city with continuous existence. While we are old in years we feel quite young in ideas, for we have made great progress here, as you will see in looking over our city—great improvements in streets, buildings, and parks.

To the ladies, I wish to call attention to the Educational Building, where they can find many things of interest while the gentlemen are attending to their business duties.

It is a pleasure to welcome delegations, but a greater pleasure to welcome a generous delegation such as you represent this morning, for it is as large a delegation as I have welcomed here. We are glad to have groups come here for conventions. We feel we are a natural convention city. We are centrally located and a great deal of business is done here.

We feel we are fortunate that our city has had no particular unrest during this strenuous period of discontent that is abroad throughout the land. This is not due particularly to the administration, except through the co-operation of the people with the administration to keep the city in a quiet contented condition. It has not always been easy to do, but the people here are like the Scotch, very clannish, they stick together pretty well. It is such groups as the dental association and other fraternal and business organizations that have made our executive existence rather pleasant.

I extend to you a most hearty and cordial welcome to the city of Albany on behalf of the city and also on behalf of the Chamber of Commerce, whose offices are on the first floor of this building; and if any of you wish any assistance or information, the secretary will be glad to extend it to you. I trust your



visit here will be full of pleasure and profit in every way, not only to you, but to us all. I thank you.

### Response.

By Dr. R. OTTOLENGUI, New York City.

*Mr. President and fellow members—especially Mr. Mayor.*—In times past, the New York State Dental Society has become quite accustomed to receiving a warm welcome in this city; in fact, frequently it has been so warm that we have felt we had the right to walk around with our coats on our arms. The first welcome we received here, however, was so chilly that one was reminded of the Irishman who was puzzled about the weather, and asked his friend, "Mike, is this last winter or next winter that we're having?" I am glad to see, however, that the mayor of the city has extended us a really warm welcome.

Now, Mr. Mayor, you have told us a little about the city of Albany, and perhaps it would not be amiss for me to touch lightly on our profession and our aims, especially as we find ourselves today in an unusual situation, that is to say, we have a real live mayor, one of the liveliest in the State, in the position where he has to give us the time to listen. Usually when we call on mayors we go in on tiptoe, and the mayor says, "Well, what is it?" and it drives every word of what we were going to say out of our minds. That is particularly true in New York, where our mayor is rather more of an emperor than a mayor. We go to the mayor to try to get him to help us in some of our eleemosynary work, to help the community, but we are generally met with one of two propositions: either that the city has no money for such nonsense or that we are trying to feather our own nests.

I want to assure you, Sir, that the dental profession is very serious in the present propaganda that many bodily ills are dependent on tooth troubles, and in the last analysis we feel that the only remedy for future generations will be to have less tooth troubles, and preventive dentistry, like preventive medicine,

must take the place of the curative efforts of the past.

I am appealing to you, Sir, because I understand you will soon be at a meeting of the mayors of the State, and the Board of Health will bring before you some of its measures for increasing the health of the various communities throughout the State, and I would like you to take this message to them—that the dental profession as a body are heart and soul anxious to do their full duty without remuneration toward the health of the communities of this State.

Dr. Waugh, the vice-president, then took the chair, while the President read his address.

### President's Address.

By HORACE P. GOULD, D.D.S., Brooklyn, N. Y.

#### THE FOCAL INFECTION MANIA.

All manifestations of human activity are subject to the ebb and flow of the tide represented by public opinion. It is perhaps within the range of memory of most of our members when the profession passed through several stages of hysteria of marked disturbing consequences. None, however, have been the cause of such alarming effects on both the profession and the public as those brought about by the focal infection mania. This condition is considerably intensified through the misleading influences of self-appointed specialists in our own profession who claim that few besides themselves are qualified to diagnose such infections.

It is further complicated through the arrogation by physicians of the ability to diagnose dental infections and their lack of ethics in referring patients with evidences of dental infection to dental specialists of their own choosing, instead of sending the patient to his or her own dentist. Owing to this situation the sane and conservative practitioner of dentistry is today hampered by the radicalism and conceit of his fellow dentists and by the thoughtlessness of the medical profession.

My criticism of the medical profes-

sion in this matter is not made with any spirit of animosity. It was my privilege for more than twenty years to be in close and cordial co-operation with the medical profession in hospital work, and I have nothing but the warmest approval of their efforts. I most emphatically maintain, however, that the average dentist is just as well qualified to diagnose conditions in his field of endeavor as is the average physician or surgeon in his domain.

If this situation affected the practitioners alone it would not be so bad. But as it carries with it a certain psychic effect which undermines the fundamental principles of confidence, it therefore creates in the minds of patients an uncertainty and distrust for both professions which is doing incalculable harm. We have all had patients come back to us after being sent by their physician to some other dentist for oral diagnosis. They tell us that the other man was recommended to them as a "specialist in oral infections." Thus, instead of the physician conferring with the patient's own dentist and ascertaining his inability to cope with the situation, the patient is at once sent elsewhere. By the time the patient returns to us his mental condition is so disturbed that it is more difficult to get results, because, as we all know, in dentistry as well as medicine, the mental attitude of the patient is an important factor. A great deal depends upon the co-operation of the patient in the efficacy of the treatment.

#### SUGGESTION FOR PROMOTING CLOSER CO-OPERATION BETWEEN PHYSICIAN AND DENTIST.

In order, therefore, to avoid complications arising from such practices of physicians and in order to promote a closer co-operation between physician and dentist in the care of patients, I would suggest that a committee be appointed to take this in hand, this committee to consist of one member from each district. Each member shall send to the secretary the names of all the med-

ical societies in his district. Moreover, a letter should be drafted to be signed by the President and Secretary and sent to each medical society. This letter is to state the foregoing conditions and request the members of the several medical societies to refer the patients back to their own dentist for consultation when necessary.

The letter should also refer to the fact that the physician can readily secure from the local district dental society a list of ethical practitioners in his district when desired.

#### REMUNERATION FOR ESSAYISTS.

The reference to the self-appointed specialists having no exceptional qualifications other than their own egotism is borne out by abundant evidence from recent society gatherings. It only needs to be mentioned that some of our dental essayists and teachers of postgraduate courses, who are being called upon for services at the present time, do not act as would be expected in professional circles.

Many men are reading papers and conducting courses in technique which might be very instructive if given to a body of students. And yet when appearing before the profession they ask as remuneration sums that by far exceed their earning capacity as practitioners.

As an example I will cite the case of a man invited from the Middle West to read a paper at a meeting in New York City. When asked the amount desired to cover his expenses he replied that he wanted \$750. This notwithstanding the fact that on this same trip he was delivering lectures in a postgraduate course for which he received additional remuneration. Contrast this with the case of another man from the Middle West who read a paper at the same meeting and who requested a compensation which only covered his traveling expenses.

The dental societies should not expect to receive something for nothing. A man who prepares and reads a paper is entitled to receive a reasonable compen-



sation for his time and expenses incurred in preparation of illustrations, etc., but in the last few years many men have found it more profitable to preach than to practice.

This is not a criticism of the man who when asked to read a paper before a society does his best, and is willing to accept a reasonable compensation. Such organizations for instance as the Detroit Clinic Club, who have spent a great deal of time systematizing technique for postgraduate courses, are entitled to a much larger remuneration than they ask. But to them the question of remuneration is of secondary importance.

It is time, however, that the profession realized the fact that there are profiteers in our own ranks. There are men conducting postgraduate courses and reading papers which are elementary in character and are profitable only to the author or to the teacher. Such essayists should be eliminated from dignified dental society meetings.

The science of dentistry advanced fully as rapidly before the day of the profiteer. We are proud of the fact that we still have many capable men in our own ranks whose first aim is the elevation of our standard. Among such I would class our Board of Dental Examiners.

#### BOARD OF DENTAL EXAMINERS.

During the past year my duties brought me in touch with the work of our Board of Dental Examiners. This is a body of men who are laboring hard for the advancement of our profession and the protection of the public health, in return for which they receive very inadequate remuneration and very little appreciation.

How many of you realize the amount of work an examiner is called upon to perform? In addition to preparing questions, he has 600 to 700 papers a year to examine, besides attending practical examinations and meetings of the board. For all this work he receives a remuneration which barely covers actual ex-

penses, and does not compensate him for his time. When I tell you that four papers per hour is the average number that an examiner can read and mark, it will give you an idea of the time required for that work alone.

When a vacancy occurs on the board from any district the district nominates a member for appointment by the Regents, and the poor examiner is forgotten by his society. As the examiners are nominated by districts they are actually a district representative, and as such I believe it would be advantageous to have them render a report at the annual meeting of their district society. This for the following reasons:

(1) Because it would give the societies an idea of the extent and scope of the work done by them.

(2) Because a discussion of some of the problems of the board might result in suggestions that would assist them.

(3) Because it would familiarize the members with the requirements of the advanced syllabus required of students today, a knowledge which they can obtain in no other way. It might at the same time act as a stimulus to many of us to keep abreast of dental educational standards and thus fit us to render better service to our patients, which I believe to be the ideal of every member of our society.

#### OUR DENTAL STATUTES.

Since the adoption of our present dental statute under which the Regents supervise advertising, there is a noticeable improvement in the character of signs displayed, which must inevitably result in the public looking upon dentistry as a more dignified and respected profession than in the past.

As advertising of prices and claims of superior skill are no longer permissible there is very little advantage to the young practitioner in starting by advertising. This has resulted in a noticeable increase in the membership of our societies, our average increase throughout the state this year being nearly fifteen per cent.

For the drafting, enactment and en-



forcement of this law our thanks are due to Dr. A. S. Downing, more than to any other one person.

#### LIABILITY INSURANCE.

As a result of the activity of the Trustee of our Group Liability Insurance, Dr. G. B. Palmer of New York, we now have over eight hundred of our members protected by this insurance. The company has co-operated in every way possible to protect our members. During the past two years, for instance, the company has not found it necessary to call on any policy-holder to testify in court.

I should feel guilty of gross neglect if I failed to recall one of the departed. It is with great sorrow that we record the loss of one of the four surviving charter members of the Dental Society of the State of New York, Dr. H. S. Miller of Rochester, who passed away in February of this year.

In conclusion I wish to emphasize that from evidences gathered by general observation the dental profession has every reason to congratulate itself on the gigantic strides of progress made within a very few years, and entirely due to your own efforts. It is but a very short time since dentistry was blamed by medicine for many ills befalling the human organism. A considerable part of the dental art, it was said, produced most of the oral pathological conditions that affected the general system. Now it is found that the oral cavity was not to blame but rather the generally prevailing pathological conditions with which the dentist had to cope. This was due to the past tendency of the medical practitioner to overlook the oral manifestations in his usual diagnosis.

With the realization of the fact by the medical man that the teeth are vital structures and constitute an important part of the organism as a whole, and with the recognition by the public at large of the necessity of cleanliness of the mouth, largely due to the efforts of the oral hygienists, dentistry has become a worldwide recognized profession that

contributes considerably to the welfare of mankind.

Having reached the position now occupied we must not imagine we have reached the pinnacle of success. We must realize that this is only a phase in the evolution of dentistry.

It is most unfortunate that even at this stage of progress men in our own ranks are constantly making statements of a damaging character. Not infrequently such statements reach the public by way of the press and do considerable harm. I have reference to statements like those made at the American Medical Association to the effect that "Modern dentistry is producing more disease than any other one cause," and expressions of a similar character that have recently been published and quoted to the public at large.

Dentistry has proven its unquestionable importance, undoubted value, in the realm of science and art of healing, despite such derogatory assertions. Our profession has therefore every reason to pride itself in the ability not only to live down all such wrong accusations, but also to make good in every phase of responsibility allotted to it by fate. I therefore wish to congratulate my fellow members of this society upon their unqualified success in raising the plane of dental achievement to the high level now occupied, and at the same time express my deep appreciation of the honor and responsibility intrusted to me as the standard bearer of such a conscientious class of men as constitutes the Dental Society of the State of New York.

The address was referred to the Committee on President's Address.

#### HONORARY MEMBERSHIP TO DR. DOWNING.

Dr. GOULD. We are honored today by the presence of Dr. Augustus S. Downing, Assistant Commissioner of Education of New York State.

Dr. Downing.—You have labored long and conscientiously for the elevation of the profession in this State. Your efforts have not only benefited the profession in

this State but must have had an influence on the health of humanity throughout the entire world. All this you have done without any hope of reward but simply as a duty.

As a recognition of our appreciation of your work for our profession, I am authorized by the Executive Council of this society to tender to you honorary membership in the Dental Society of the State of New York. This is intended as an honor to you, but we feel that the acceptance by you would confer a greater honor on our society.

Dr. A. S. DOWNING. I cannot accept all that this very gracious and fulsome statement of your president sets forth in his address in regard to the dental law of this State. When in 1908 I by chance was appointed to my present position, the subject of dental education and consequently dental practice in this State became a subject for most careful study, and of most fascinating interest. With the assistance of the State Board of Dental Examiners I was led into a knowledge of conditions in this State, both as to education and as to practice, and pretty soon that knowledge extended outside the State, and ultimately throughout the United States. Aside from those who are professional inspectors of schools for the purpose of rating them as A, B, C, or D, or good for nothing, I think I may have been in quite as many schools in different parts of the country as any other one man, for the purpose of knowing what those schools are, and what the education is. Then came the question of practice, and immediately it became evident that the then Dental Practice Act was not protecting the public, and was in no sense for the interest of the real dental profession—of those men who work for the public more than they work for themselves. I still, in this day of distrust, have the utmost confidence in the altruism of the men that are before me, and the men of the dental profession, as well as the men of other professions. I believe that primarily men do not enter the dental profession or

the medical profession or any one of the professions dealing with public health, from a commercial point of view but rather with the highest motives; above all else, that they are going to serve their fellow men so that when they lay down the mantle, they can conscientiously say, "I have not lived in vain, nor unto myself alone, but I have lived as best I could for the good of my fellow men."

When I lose my faith in the better motives of men and women I want to be taken away from this earth.

The Board of Dental Examiners of this State and the prominent men of this profession are very much more entitled to credit for the present dental law than am I. I am an optimist, and when they told me we could not put this law on the statute books, I said, "Maybe not the first year, nor the second, nor the third, fourth or fifth, but if it is right, we will ultimately convince the public that it is right, and it will be a law."

I do not take to myself credit for the passage of that bill, but the men of this profession got behind the bill, and now it is a law. There were some things in it that we stood for, that I would not budge one inch on, things that would have let down some of the standards. One was the dental hygienists. We hold the dental nurse up to a standard, and she will be of great service to the profession in this State, already she is of great service. Pennsylvania has taken our cue and has favored a law for dental hygienists in opposition to those who were against it. We have been progressing in this manner, but it is not due to me.

Now may I say to you that it is with really great gratification, most unexpectedly, that I gladly become associated as a member with you of your society. All there is in life, ladies and gentlemen, is right association with our fellow men; that is what you get out of life. No man lives unto himself. The hermit is not happy, but when a man can be associated with a body of men like this, and know he stands with them as one of them—when they have to fight, he fights with



them, and when they are enjoying life he enjoys it with them—it is a very great honor indeed, and I may say it is more highly appreciated by me than you know.

Now let me give to my friends, Dr. Terry and Dr. Dow, all the credit for enforcing the law. I only take a hand in that when it becomes absolutely necessary, and guide and direct them as a counsellor. They are the men who do the work, and may I tell you, if you do not know, the greatest triumph in the enforcement of law occurred a few months ago, over in the city of Brooklyn, when Dr. Dow, our dental inspector, was freed from all aspersion of character, and was given absolutely a clean bill of health in the Merhige case.

I am glad to be associated with you as an honorary member. I have now two honors from the dental profession, the dentists of the country, and the dentists of my own State. I have the honor to be an honorary member of the Dental Faculties Association of American Universities, without dues, and with power to vote. That is worth while in education, and as the years go by and I sit by a stream and angle for a fellow that sits back of a log, but that I cannot lure away because I have not a live young minnow, I will dream of all your joys and successes in life, and the little part I have had in doing something for your profession and for the public at large.

I thank you most profoundly, Mr. President, for the honor conferred upon me.

Dr. WAUGH. It becomes my pleasant duty to introduce the next speaker, Dr. F. T. Van Woert, who also has something of interest to say.

Dr. VAN WOERT. I liken this gathering to that of a family that is scattered throughout the country, when they get back home for the Thanksgiving or Christmas holidays. The State Society is a composite of nine district societies, children of the parent organization, and like the family gathering, as we get to-

gether we like to tell of those little things that belong to our individual family circle. We of the Second District have a great pride in some of our members, and we felt that this would be an occasion upon which we might brag a little about how much we love and respect one of its members in particular. We do not feel it would be a presumption upon the members from other districts to impose this at this time, because we believe you will give your hearty approval of the honor we want to do one of our honored members, your distinguished president.

There is probably no one, not only in the Second District but in the entire New York State Dental Society, who has worked harder and whose energies have been more wholly concentrated upon the very best interests not only of this society, but of the profession at large. He has served for a number of years on the Council of the Society; he has served us individually for a great many years, and we have the highest regard for him as a man, and are proud that he is president of this parent organization. I personally, as one of the young men of the society, look up to him, and feel I ought to be proud.

I want Dr. Gould to realize that there is a time and place for everything, and the time has arrived for Dr. Gould to accept from the members of the Second District Society this little gift. I hope when he finds it necessary to take the time by day or night, that he will see reflected on the face of this watch, in his mind's eye, a picture of all those dear ones who respect him and love him so well.

Dr. Gould, it gives me great pleasure, in the name of the Second District Society, to present to you this watch and chain.

Dr. Gould received the gift with emotion, and said he would make a more fitting reply later.

(To be continued.)



## Pennsylvania State Dental Society.

Fifty-second Annual Meeting, held at Reading, Pa., April 27 29, 1920.

(Continued from page 898.)

### TUESDAY—*Evening Session.*

President Schlegel called the meeting to order at 8.15.

The first item on the program for the evening session was a paper by Dr. Norman B. Nesbett, Boston, Mass., entitled "Cast Clasp Technique in Removable Bridge Work."

[Dr. Nesbett's paper will be published in a later issue of the DENTAL COSMOS.—ED.]

THE PRESIDENT. The next business in order will be the reports from Standing Committees.

Dr. H. E. FRIESELL, Chairman of the Legislative Committee, presented the report of the Legislative Committee.

The Committee on Dental Science and Literature, Dr. L. Pierce Anthony, Philadelphia, Chairman, presented its report.

[This report was published in full at page 742 of the June issue of the DENTAL COSMOS.]

THE PRESIDENT. The next committee to report is the Committee on Oral Hygiene and Public School Dental Education, Dr. E. R. Sausser, Philadelphia, chairman.

### REPORT OF COMMITTEE ON ORAL HYGIENE AND PUBLIC SCHOOL DENTAL EDUCATION.

Dr. SAUSSER reported as follows:

The Committee on Oral Hygiene and Public School Dental Education has made a careful survey of the general situation in Pennsyl-

vania, has visited leaders in the movement for oral hygiene in several states in which work of this kind has been successful, and has come to the following conclusions:

(1) That the vital importance of the care of the teeth through such means as Oral Hygiene is fully recognized by the public of this state, making it practical to carry on this work if the means are supplied.

(2) That this fact has been recognized by the Health Department of this State, who have started an organization made up of dentists, physicians, and dental hygienists, for the purposes of taking over the preventive phase of the care of the teeth of the school children in Pennsylvania.

(3) That the statistics show that the condition of the mouths of school children as recorded in many states and the improvement following oral hygiene were most striking.

(4) That the other States in launching Oral Hygiene and Public School Dental Education were confronted with virtually the same objections as in our State. These objections were easily proven to be insignificant by practical test.

(5) That in February Dr. Edward Martin, Commissioner of Health of Pennsylvania, in an address before the Central Pennsylvania Dental Society, asked that a form for a pamphlet or a series of pamphlets on oral hygiene be suggested by the dentists of the State to be printed by the State Health Department for distribution in the public schools and among the parents. This clearly indicates that our State means to take up the question of public school dental education, which places our committee in a position where it must ask for instructions from this society as to the advisability of co-operating with the Health Department or dealing with the subject in an impractical way, as an independent body.

(6) That the public will accept any means instituted along these lines by the Health

Department which will be in the interests of the health of the State.

(7) That this society should by proper means be in more active co-operation with the public, the physicians, the school authorities, and the State health authorities, if it is to become a factor in preventive medicine in this State.

(8) That granting such co-operation could be had in the near future, the tremendous burden which would be placed upon the profession because of the increased popularity of dentistry and the added duties of providing for the oral hygiene of school children would be such as to make the task impossible without the aid of an agent such as the oral or dental hygienist.

It is therefore the urgent recommendation of this committee that this society by suitable resolution put itself on record as favoring the enactment of a law which will legalize and regulate the practice of the dental hygienist in this State, and that for such purposes a committee be appointed consisting of an adequate number of members to draft a suitable bill for presentation to the next session of the legislature with the request that the same be enacted as a law at an early date.

E. R. SAUSSER, *Chairman*,  
S. B. LUCKIE,  
V. H. MCALPIN,  
W. B. MAUSTELLER,  
PAUL B. BYERLY,  
*Committee.*

It was moved and carried that the report of the Committee on Oral Hygiene and Public School Dental Education be adopted.

Dr. J. C. NUGENT, Altoona, offered the following resolution:

RESOLVED, That the Pennsylvania State Dental Society desires the enactment by the Legislature of this State of a law creating and regulating the practice of the dental hygienist in this State, and that the president elected to serve for the next year do appoint a special committee of seven members of this society to prepare a bill to be known as "The Dental Hygienist Bill," and submit the same at the next session of the legislature of this State with the society's recommendation that the bill be enacted into law.

The resolution was seconded.

After considerable discussion Dr. Quinn moved and the motion was car-

ried, that the resolution be laid on the table until Wednesday afternoon at five o'clock.

Adjourned until Wednesday morning.

### WEDNESDAY—Morning Session.

Vice-President Dr. R. H. D. Swing called the meeting to order at 10 A.M.

Dr. SWING. The first item on the program for the morning session is a paper by Dr. ALEX. H. PATERSON of Baltimore, Md., entitled "Perfection in Lower Impression Dependent Entirely on Knowledge of Parts and Manipulation."

[This paper is published in full at page 978 of the present issue of the DENTAL COSMOS.]

### DISCUSSION.

Dr. Cecil O. Booth, Pittsburgh. *Mr. President*,—I am sure we all appreciate the work that Dr. Paterson has given us. The method which he has shown us for the examination of the lower jaw is pretty thorough and is worthy of our consideration. In order to have the best possible results in a denture it is necessary to have an accurate knowledge of the anatomy of the parts. This is the point that Dr. Paterson is endeavoring to impress in his presentation. The method that he uses for impressions, I believe, is a good one, and his technique is also good. I wish to make a few remarks on some points of his technique. In the selection of a tray in which we take the initial impression, I believe a tray should be selected which conforms as nearly as possible, to the desired base outline of the finished denture. This aids not only in the establishing of a correct periphery outline through that base, but it also leads to a definite impression. I myself always make it a rule to get established in the mind of the operator a concrete or definite knowledge of where that outline is to be designed, to give it the form and correct periphery outline. The operator must exercise muscle movement in order to establish the correct outline or border of the buccal and labial



tissue, and also must examine the mylo-hyoid ridge. I believe that while taking the initial impression in compound, the trimming by muscle movement will aid in the final establishment of a peripheral outline. The tray as it is formed needs to be trimmed. This can only be done by repeated trials and trimmings in the mouth direct. The tray should not encroach upon the mesial attachment or the buccal or labial attachment. It should not extend over the mylo-hyoid ridge. The success of an impression of this character depends entirely upon the conformation of our tray. The idea is to secure in our impression an exact condition just as we would want to reproduce it in the final step in the denture. This can only be done by the proper construction of the impression tray in the mouth. As to the consistence of plaster used, while it may be stated definitely that there must be an accepted consistence, I believe, however, that all these steps will have to be worked out individually by each operator. I wish to thank Dr. Paterson for this most excellent exposition and for the talk he has given us.

**Dr. Frank A. Fox, Philadelphia.**  
*Mr. Chairman, Dr. Paterson, and Members of the Pennsylvania State Dental Society,*—I want to compliment Dr. Paterson on his comprehensive treatment of the subject and especially for the beautiful collection of specimens that he has exhibited before us. There is really very little in the way of discussion that I can offer because I am most thoroughly in accord with all of the principles in the technique which Dr. Paterson has given us. Too much credit cannot be given to such men as the essayist for the careful study and many, many hours of hard labor they have given toward the advancement of Prosthetic Dentistry.

I am especially glad to hear Dr. Paterson give credit to Dr. Hall for the untiring effort he has put forth along this line of work. I had the pleasure of being present at a clinic given by Dr. Hall at a meeting of the Pennsylvania Association of Dental Surgeons some four or five years ago. It was when Dr. Hall

first introduced his thought on correctable plaster impressions, and on that evening he exhibited three patients with full upper and lower dentures. I happened to be one of three men who were asked to come up on the stage and test the adhesion of the lower dentures and I might say that after the three of us were through tugging at these lower dentures, one of the mouths actually bled from the irritation.

The technique which Dr. Paterson has outlined is most valuable, especially his careful study of the mouth and the accurate trimming of the tray. Too much cannot be said on the accuracy of trimming the tray, as this, after all, is the keynote of the whole technique. I shall be glad of the opportunity of seeing Dr. Paterson demonstrate his method in tomorrow's clinic.

There is one question I would like to ask Dr. Paterson. When I heard Dr. Hall some years ago, I understood him to say that he used the black modeling compound as an impression-tray material especially because it gave such a sharp contrast with the white plaster, and when he introduced the tray with the thin mix of plaster into the mouth for his correctable impression, the movement of the muscles would cause a proper displacement of the plaster. On the removal of the impression, if any of the black compound was visible, it plainly showed that the tray was too long at that point and he would then chip out some of the black compound, again put a thin mix of plaster over the first mix, then try in the mouth again for muscular action, and repeat that technique until he was satisfied that the black compound did not interfere in any way with the action of the muscles. I want to ask Dr. Paterson if he follows that technique and also what movements he asks his patient to make after he inserts the tray covered with soft plaster in the mouth? We use a method somewhat similar to this in our clinic at the University of Pennsylvania with very gratifying results.

I had the pleasure recently of attending a course of lectures given by Dr. Schlosser on correctable impressions



taken with modeling compound. This after all seems to me to be the best adapted of all impression materials for this work. One can get any degree of density of the material by controlling the amount of heat that it is subjected to, and in this way get uniform pressure over the mouth, and therefore get greater adhesion under masticating stress. This method produces its own outline. Dr. Paterson mentions the fact that it took him about four and one-half years to perfect himself in marking out the definite outline by the method described in his paper. I feel sure that the student or the practitioner would get more accurate results in a shorter time with compound than with plaster.

Dr. Schlosser had for his patient in this course of lectures a type of mouth that we all occasionally meet, a jaw that had those large bony protuberances on the alveolar ridge back by the tuberostities. Of course we all know the ideal way to treat these cases is to have the protuberances removed surgically, but not all of our patients will submit to that treatment. Dr. Schlosser obtained a most satisfactory result in this particular case, and I cannot help but feel that a plaster impression would have been a failure in such a case. The plaster would only lock itself beyond these protuberances and, while we might get an impression of the mouth, we would never be able to get a denture back into the mouth if it were made over a cast drawn from a plaster impression.

I would like to ask Dr. Paterson what treatment he would give a case of this kind should he meet similar conditions.

**Dr. Norman S. Essig**, Philadelphia. I have listened with much interest to the paper by Dr. Paterson, and am more than glad to know that he is still diligently searching for truths that lead to the perfection of his ideals.

Back in my head somewhere there is a fragment of an old ballad which suggests a singer and a song, and while I cannot quote it, it reminds us that while we may and probably will forget the singer we will never forget the song and so on; so in our enthusiasm we must

not expect to get all credit for our labors.

We have dental schools and professors, and what for? To focus attention, and compile out of the great mass of research the things that will benefit the student, and the practitioner and lead to future development with ultimate benefits to mankind.

I am somewhat disappointed that Dr. Paterson does not give us more of his own personal work, for I know him to be a most conscientious and diligent man, and he must have many methods which have arisen from his experience in practice; in fact I know he has if he would but lay aside his modesty and take us into his confidence.

After all, is not our main idea to obtain accuracy in our work? Is that not what brings us together today regardless of who conceived the first idea? Very few things come to us in this life fully developed. Almost everything is an evolution, a growth, and one of the functions of every conscientious man is to add his quota to the general fund.

Let us compare the method of taking impressions one hundred years ago to that which is in vogue today. Think of the Japanese carving dentures out of solid ivory! If we look at the specimens of old dentures of the different periods we must of necessity note many changes in form and method, from the spiral spring to the air-chamber, and from then on until the present day when we are turning the whole denture into an air-chamber. Partial dentures evolved from a certain terribly crude sort of bridge found in the heads of the mummies, and back again to bridge work before that phase of prosthesis finally settled down (if it really has) to a sane removable fixture, which is really neither one nor the other, but indebted to both.

Dr. Paterson is one of those men into whose hands the task of further development should fall because he is not easily satisfied or discouraged, and apparently never tires of work.

The mental picture spoken of by the essayist is where the results of men differ most, and I was about to say the keynote

of the matter, but in that I might go too far. This varying mental impression has been the cause of about ninety-nine and nine-tenths of the failures in the taking of impressions.

Until the coming into more or less general use of compound in combination with plaster and the metallic tray, only a few men had an accurate conception of the basic principles which underlie denture making. This method has taught us much and I can see great development already.

Today it is possible for the average man to do much better than he knows by the use of this combination of materials. We dentists will in the future become much more familiar with the muscular attachments and general anatomy of the mouth than ever before.

We could not for a moment contemplate the work of the dentist in the reconstruction of those mutilated human beings who emerged from the war, without realizing what was learned by saddest experience concerning the use and importance of the muscles that operate and control the movements of the mandible.

All of this work, however, depends upon the accuracy of the impression. I am on record many times in the last fifteen years as urging accuracy in this department of dentistry, and a plea (if I may be allowed to quote myself) for a model so accurate that allowance shall not have to be made for the slightest detail, and I believe we are very close to it at this time.

I have always regarded the plaster model as the foundation, and the outline of the denture to be made upon it marked accurately as the specifications, in order that we may hold ourselves and others responsible for the mental picture conceived by the operator and its maintenance throughout the ensuing steps in construction. I believe this can be done with artificial teeth by giving the profession a sort of predigested plan evolved in much the same way as has been done in impression taking, and which will also enable him to obtain in many instances greater artistic achievement than he could produce solely by his own efforts.

**Dr. Paterson** (closing). Dr. Booth has struck the keynote of the whole paper. His discussion not only adds strength, but brings out points which are really of prime importance.

*First.* The examination of the mouth. This is the foundation of the whole system and cannot be emphasized too much. A careful examination of the mouth is necessary so that you will have a thorough knowledge and a clear conception of its contents before trying to reproduce them in plaster.

*Second.* The fingers must be as carefully trained as the eye; the examination is digital as well as optical.

*Third.* Trimming the tray. This should be done in such a careful manner that the design of the tray should approximate as nearly as possible the finished impression. All the tissues of the mouth should be taken into consideration and the tray trimmed to accommodate them. The prepared tray should be in appearance all that you would expect in the finished denture.

*Fourth.* Dr. Booth spoke of the repeated returning of the tray to the mouth while the trimming is being done. This is absolutely correct. Return it to the mouth as many times as is necessary in order to determine whether or not you are obtaining the result sought or securing the freedom desired throughout the full extent of the peripheral border.

Dr. Fox spoke about the contrast of the black compound and plaster. That was Dr. Hall's original idea, to have the compound colored so that he could determine at a glance upon the removal of the impression from the mouth whether or not he was producing any pressure by the compound appearing through the plaster. In those days after taking the first impression, should the black compound show through, he would relieve it at those points and take another plaster impression on top of the first, and even go so far as to take the impression over three or four times. This is permissible, but not practical. The better way is to relieve the tray where it shows through and then remove all the plaster and re-take the impression.



The plates described in the exhibit were three ply, or rather made from an impression taken with three successive layers of plaster. This clearly illustrates the error of this technique, for they show the periphery very much thicker and higher than it should be and are not much more accurate than an impression obtained following the old plaster impression method. It was only after careful study of the mouth, using different mixes of plaster, elimination of the layers, and experimentation that we finally arrived at the point where we understood the proper height and thickness of the periphery.

Dr. Fox inquired if I did any muscle stretching. Were I using a comparatively slow setting plaster, such as Kerr's snow white, then I would employ the stretching plan, following Dr. House's technique. However, with a quicker setting plaster, which is my preference, having the tray scientifically prepared and the plaster mixed to the right consistency, it is not necessary, in my opinion, to do any muscle stretching; the tissues automatically take their normal positions and are reproduced without distortion.

I have made the statement that it had taken me four and one-half years to fully appreciate the correctness of the finished impression, and I feel that it would take another person equally as long to arrive at the same point of appreciation. I will modify that statement somewhat, because when I first started to practice this theory it was just in its infancy and had to be worked out.

I was with Dr. Hall at the time to which Dr. Fox refers. Just at that time he gave a clinic at the S. S. White Company's place in Philadelphia. That was four and one-half years ago, and it was through the courtesy of the S. S. White Company that I was permitted to see Dr. Hall's original work. I have always felt that it was a nice thing for them to do and I do not believe that I have ever thanked them for it, but I shall do so publicly now.

The proper procedure having been established, the length of time necessary

to learn it would be determined by the individual's ability to grasp and apply the principles of the technique and carefully follow the steps as they are presented.

Dr. Fox has asked how we would handle extreme cases with very large and extensive condyles. I have just had such a case and referred it to the oral surgeon to have them removed. I will admit that, without proper surgical treatment, these cases are difficult. We employ two methods of getting the plaster up around the condyles, providing no surgical operation has been performed. One method is to cut a "V" shaped space in the tray, and, when the tray is carried to position in the act of taking the impression, the plaster is squirted up into the buccal space (House). The other is my own method, in which I use a small pipet for the same purpose, and is only used if we fail to copy at these points in taking the impression. The incomplete impression is returned to the mouth and the pipet is used to carry the plaster to the point where it is lacking. The tissues are permitted to assume their normal positions to mold and finish the impression.

I have built these points up with compound, but not with the same idea that Dr. Schlosser has. So far I have experienced no difficulty in having my patients submit to surgical operations.

Someone has asked what I thought of the modeling compound technique. I do not wish to argue the merits or the faults of the compound technique with this or any other society, and will only say that the compound technique is all right, but it is only all right if properly performed.

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It was moved and carried, that the Society extend a vote of thanks to the essayist for the paper which he presented to the Society.

#### ELECTION OF OFFICERS.

The society then proceeded to the election of officers for the ensuing year, which resulted as follows:



*President*—Dr. R. H. D. Swing, Philadelphia.

*First Vice-President*—Dr. J. F. Biddle, Pittsburgh.

*Second Vice-President*—Dr. W. H. Lowell, Lancaster.

*Recording Secretary*—Dr. W. L. Fickes, Pittsburgh.

*Corresponding Secretary*—Dr. O. J. Specker, Reading.

*Treasurer*—Dr. A. B. Miller, Kingston.

*Board of Censors*—Drs. B. P. Rial, C. V. Snyder, W. J. McKinley, W. H. Fordham, Ford Hayes.

*Board of Examiners*—Drs. J. D. Whiteman, W. D. DeLong, V. Cochran, C. S. Van Horn. *Members of Council*—Drs. M. F. Quinn, P. V. McParland, W. J. Robinson, H. W. Bohn.

Adjourned until Wednesday afternoon.

#### WEDNESDAY—Afternoon Session.

PRESIDENT SCHLEGEL. Gentlemen, the next order of business will be to take action on the resolution presented yesterday by Dr. Nugent, which, on motion duly seconded, was laid on the table until this time.

Dr. SAUSSER. *Mr. President*,—I desire to offer an amendment to that resolution. In order that the society may authorize the proper drafting of the law which will be submitted to the Legislature at the next session, I suggest that the resolution be amended and offer the following amendment:

That the committee shall consist of three (3) educators of the Pennsylvania State Dental Society: Drs. H. E. Friesell, Pittsburgh; I. N. Broomell, Philadelphia; C. R. Turner, Philadelphia, who shall be empowered to increase the committee to seven (7).

Dr. MAUSTELLER offered the following amendment which was seconded and carried:

That Dr. Broomell, Dr. Turner, and Dr. Friesell be named as the representatives of

this Convention and that the four additional members of this committee be appointed by the president elected to serve for the ensuing year.

Dr. QUINN offered the following amendment:

That the committee of three (3) named by this Convention, together with four (4) members to be appointed by the president elected to serve for the ensuing year, be instructed to draw up a bill to be presented to the Legislature of the next session, licensing properly qualified dental hygienists for cleaning teeth in all the schools and to give instructions in oral hygiene to the children and to include all charitable institutions when under dental supervision.

After a lengthy discussion a vote was called for on Dr. Quinn's amendment and resulted in 117 votes in the affirmative and 171 votes in the negative. The chair declared the amendment lost.

THE PRESIDENT. The question now is on the adoption of the resolution as amended.

The Secretary read the resolution as follows:

RESOLVED, That the Pennsylvania State Dental Society desires the enactment by the Legislature of this State of a law creating and regulating the practice of the dental hygienists in this State and that a special committee of seven members of this society shall prepare a bill to be known as the "Dental Hygienist Bill," and submit the same at the next session of the Legislature of this State with this society's recommendation that the bill be enacted into law; and the committee shall consist of three educators of this State named by this convention, Dr. Friesell, Dr. Broomell, and Dr. Turner, and that the four additional members of the committee shall be appointed by the president of the Pennsylvania State Society who is elected this year.

The resolution was passed almost unanimously.

On motion, the convention adjourned until eight o'clock P.M.

(To be continued.)

## Academy of Stomatology of Philadelphia.

Regular Meeting, Tuesday, March 23, 1920.

THE meeting was called to order by the President, Dr. Guilford, at 8.15 P.M.

On motion, duly seconded and carried, the regular order of business was suspended, and the society proceeded at once to the scientific program of the evening. The President called on Dr. ALBERT H. STEVENSON of New York to read a paper entitled "The Case of the Dental Hygienist."

[This paper is published in full at page 930 of the present issue of the DENTAL COSMOS.]

### DISCUSSION.

**Dr. Thomas J. Barrett**, Worcester, Mass. *Mr. President and Members of the Philadelphia Academy of Stomatology, Ladies and Gentlemen,*—When I received the invitation to come here tonight and discuss the paper just read to you by Dr. Stevenson, I hesitated somewhat in accepting the invitation. I had appeared before your State Society at Pittsburgh within the year, and had read a paper there, giving my version and my opinion of the dental hygienist. Following the reading and discussion of that paper, your society voted on the question and gave practically a unanimous vote in opposition to the legalizing of the dental nurse in Pennsylvania. Naturally, I was somewhat surprised when I was asked to come here and discuss a paper that had to do with furthering the interests of the dental hygienist in Pennsylvania.

I congratulate the essayist of the evening on his paper, and, from his viewpoint, he no doubt has covered, most acceptably to the advocates of the hygienist, their views and presented the strongest argument that could be ad-

vanced in support of this type of dentist. I have many times in past years heard similar arguments, with some few modifications, and some changes of minor importance as to requirements.

In order that we may intelligently discuss this question, I desire you to know what my attitude is and has been on this subject for a number of years. *I am opposed to licensing anyone to operate in the mouth* who has a lower standard of educational qualifications and training than is at present demanded of the dental student. That has been my position from the first day I ever heard of the dental hygienist, and it is my position today.

I congratulate Dr. Stevenson on the slight advance that his paper has suggested in the way of additional training, and it is the first advance in time of study or training that I have ever known to come voluntarily from advocates of this type of dentist. I am pleased to know that he recognizes her lack of education and dental training. I commend him for his stand on that and hope that in time he will reach the standard that I have always advocated, which is sufficiently low for anyone to approve, *viz.*, the standard of training required of dental students, in order to be allowed within the sacred precincts of the mouth.

At present, the hygienist in my State must have a year of collegiate training. I had to fight for six years to have that requirement adopted. Those who conceived the idea of the dental nurse in Massachusetts, said that any girl of eighteen, of good moral character and in possession of five dollars (\$5.00), and able to take an examination, should be allowed to operate in the mouth. Now, in



addition to what we require in Massachusetts, Dr. Stevenson says that he would give them an additional year in public school work, in charitable work or acting as a dental interne. That's fine, if only a step forward.

Before I go farther, I should like to say a few words in a personal way. I sincerely trust that nothing in the way of bitterness or personal statements will be made by those advocating this species of dentist, should it come to the point of bringing this matter before your Legislature.

In this discussion, I do not want it to be clouded by false issues. We all agree with Dr. Stevenson on the deplorable condition of the mouths of the American people, both young and old, and we all know that something should be done by the dental profession to improve that situation; but we do not all agree that the way to handle this condition is to legalize dental nurses and put them into dental offices as a new type of practitioner. It is a much broader question, yet advocates of the nurse point out what they have done here and there and then with a table of statistics tell us that so many mouths have been cleaned and the future is all sunshine.

The proper care of the mouth and teeth is a question for the boards of education of the various communities, working with dental and medical advice and support; it is an educational matter. You, dentists, have not solved the problem and I am sure that the dental hygienist can not.

Dr. Stevenson states that three hundred thousand children are attending the public and parochial schools of this city and estimates that each child has five cavities—about a million and a half cavities to be treated. That was offered as an argument for the oral hygienist. What can the hygienist do to better that condition? The combined forces of the dentists in Philadelphia could not check that condition. They might repair it temporarily, but the hygienist could not repair it nor improve it. She is not permitted by law to do that work and no one wants her to do it.

What bearing has that as an argument in support of the hygienist—the cavities in the mouths of the children in Philadelphia? The children in New York are in a similar condition, and Dr. Stevenson stated that the nurse has been legalized there for several years, and on his own statistics sixty of these dental nurses are in the offices of private practitioners; five of them are with an insurance company at statistical or efficiency work for their employees, leaving fifteen for charity and performing public health work and educating the people.

What is the situation in Massachusetts? We have forty-five or forty-eight registered dental hygienists. According to the Doctor's statistics, two are engaged in charity, and if I am not mistaken both are in the Forsyth Institution; two are in public schools; and the rest are tucked away in the offices of the private practitioner, not in educational work nor anywhere near the children with other hundreds of thousands of cavities. They are bread winners for their employers at cut rates.

This question was presented to us in Massachusetts as a great step in advance in the work of preventive dentistry. It was presented as a great and noble charity, but where is there charity in it, when you are serving the selected patients of some private practitioner at so much per hour? I have spent a number of years of my professional career as an examiner on a State Board and have examined many thousands of dentists; I have examined as many oral hygienists and nurses as there are in Massachusetts and know what they can do, where they learn, and I say to you as the result of an experience as wide as that of any other man in this country that the standard of requirements is too low and they are not qualified to operate in the mouth nor to treat the delicate tissues surrounding the teeth.

All of this concern and deep interest in public health and purely for the benefit of the community has not worked out this way in any place where the nurse is legalized. From the statistics that I have and that Dr. Stevenson furnishes,



she has found her way into the office of many of the prominent (?) men of the profession who are largely engaged in the humanitarian side of their own office. Once she locates in a private office, she has little or no time to consider the great and philanthropic question of serving the community. Private patients keep her busy and, as shown by Dr. Cross' comments, interest in public health has been delayed or forgotten. It has fallen flat in Massachusetts, where she has been legalized for five years past. Dr. Stevenson's own figures show that two are in charitable institutions or school work. That tells the story.

I object to the dental nurse and will continue my objection until she receives a training that, in the opinion of the unselfish majority of the profession, entitles her to operate in the mouth. No man objects to her, if she is educated up to the standard of the profession she seeks to enter, but I am absolutely opposed to any standard lower than that stated at the outset.

The profession found that the three-year product of the dental schools did not measure up to either the demands of the public or the expectations of the general profession. We have just added another year to the dental course, and we have made a rule that anyone short of fifteen units of high school work, obtained in a four-year high school course, shall not be admitted to the freshman class of any dental college in the country.

Having raised our minimum standards to four years of high school work and four years of the dental curriculum; having dentistry recognized as one of the most important branches of medical science; having put it on its own feet, and seeking recognition of the educational world, we turn around and say that, with an affidavit in some States, five or six to eight months' course in other States, we can train people to operate in the mouth and do what you, as dentists, say is preventive dentistry and the best known method today of saving teeth. This is to invite ridicule. You are creating two types of dentist and show lack of confidence in either type.

We have made uniform dental education and the requirements for entering upon the study of dentistry. Now, I appeal to you, as men proud of your profession and glad to see its standards raised, not to do anything that will tend to lower them. Men have spent their lives in the endeavor to raise the standards of dental education and tried to bring it to a high level; then you open the back door and let one who has spent only six months in training do this work that you say by legal enactment should be done under the direction of the dentist.

I want Dr. Stevenson to answer this question. If you train the hygienist at Columbia and send her to the State Board to be examined and the State Board pronounces her fit to practice and grants her the right to practice, why then, should she be supervised by you or anyone else? She is either fit to practice or unfit to practice. I wish you to answer that question, if you please, Doctor. I think that she is as much entitled to her liberty and freedom to practice as you and that you have no right to supervise her further. She has been pronounced fit to work.

I did not come here to "put anything over" on my brother dentists or the public, but to aid you and prevent anything from being "put over" on you that you do not want. Dr. Stevenson says that people usually get what they want in spite of professional or other opposition. He referred to prohibition. We are now enjoying the blessings of prohibition, that was "put over good and tight," and I would ask the Doctor whether the people in the community that he comes from think it was "put over" or whether it represents the will of the people of New York. As the Philadelphia negro said, "I am sure I never thought of thinking that way."

If you stop, look, and listen, I am sure you will not permit this new revelation in dentistry to be legalized in this great State and "put over" on the profession as a whole and put into the private offices of a select few who represent the two extremes in our profession, the fakir and the highly ethical (?).

Until the advocates of this new revelation in dentistry make the disposition of her talents and labor fit their arguments with reference to charity and public health, how can they expect those of us who are opposed to her to have confidence in them or in her status? In Massachusetts the whole thing has fallen flat. As soon as they legalized the dental nurse, they lost all interest in the matter of public health and the dear people were left to clean up their own mouths.

If we are to have the nurses on a year's training in dentistry, why do we not have other specialists with the same amount of training and education? Why not the extractor, or, as we call him, the exodontist? No one would say that it would take more than a year to train a man to be a good extractor and I do not believe he would do half as much harm on that basis as the dental hygienist. Why not have the specialist in prosthetic dentistry? We all are guilty of patronizing the laboratory, and all we deny to the laboratory man is the right to take impressions and bites; he does the rest. If we are to set up specialists on a year's training, why not give the laboratory men a show? It would not take a year to train them to take an impression and bite. Then, if we have these, why not have the specialists in X-ray work? We have laboratories now where laymen diagnose cases for some dentists. Why not bring them into the fold? The X-ray has revealed a lot of bad dentistry that some people have done in days gone by.

In all my long experience, I have never known a time when there existed the confusion in dentistry that exists today. You are being discredited by the medical profession for the work you have done and are being charged with being responsible for various types of systemic disease. Many medical men openly discredit the work we have done, and some of them say they will not operate on a patient who has a dead tooth in the mouth; while others say that no filled root, whether the pulp was removed alive under pressure anesthesia or is putrescent, is fit to remain in the mouth. Dentistry has a lot of work ahead of it that

is far more important than this matter of oral hygiene under the direction of the dental nurse.

I may be mistaken, but nothing that has been said here has convinced me that I am. I want to say a word on propaganda, as this term expresses my notion of this whole affair.

#### PROPAGANDA.

Any one who will give a moment's serious thought to the methods employed to create sentiment favorable to this new revelation in dentistry cannot fail to recognize the skilled hand of the propagandist.

*Propaganda*, akin to advertising. It differs from advertising in this, that advertising to be successful must be grounded on truth.

It is perfectly clear to any one who has followed the dental nurse campaign, that her twin sister is Propaganda. And no development, good or bad, in the field of dentistry for twenty years past has received the support of the propagandist as has this modern type of tooth, health and life saver.

Any one seriously investigating the starting-point of this propaganda will find in each new field of bright prospects, financial as well as health, men high in the ranks of dentistry falling in line for this new revelation in dentistry. This is propaganda's triumph.

In no way can the real issue be obscured more completely than by clouding it with the "say so" of Dr. So-and-so, supposedly big man, and dare you set up your opinion in opposition to this wonderful man in dentistry or dare you match your intellect with his!

The propagandist does not refer to young Dr. So-and-so, just out of school, nor to Dr. So-and-so, struggling to get a foothold in his profession. Oh, no! Go back to school, is the advice given this four-year product of dental teaching, you cannot do prophylactic work, the hygienist is the recognized authority on mouth hygiene and health.

The propagandist secures the co-operation or at least the use of the names of



men well known, some highly respected in the profession and then proceeds to secure converts to this new species of dentist that he very much desires to install in his office; tells his brother dentists that the well-known Drs. So-and-so have come to recognize the real worth and need of this new type of dentist.

So in article after article, editorials now and then, you are constantly reminded that this great movement has back of it, Dr. So-and-so, this eminent man in dentistry. This is real propaganda. I call it a camouflage barrage. I met it long years ago and have watched its development. I have had the privilege of examining as many of this new type of dentist as any man in the country and know what she has done and where she lands once she is legalized. Now and then amidst the poor and needy, but by far the largest number in the office of the busy practitioner who needs the money.

The absurdity of the arguments for the dental nurse in private practice is perfectly apparent and requires no discussion to expose their weakness. To any dentist grounded in the practice of his profession, we all would suspect just one reason even though many of you would not care to be as open and bold in stating it as I am.

In this or any other discussion of this question, do not permit it to be clouded by false issues. We all agree on the deplorable conditions found in the mouths of the vast majority of the people of this country, young and old. We recognize that something must be done to improve this condition, but we do not all agree that the way to solve this great problem is by legalizing this new species of dentist, and then dressing her up in bib and tucker, tucking her away either in the private offices of the dishonest advertising dentist or in the refined surroundings of the propagandist.

I have taken sufficient of your time, but wish to go over the Doctor's recapitulation; and with that, I close. He says;

To summarize in concrete form what I have endeavored to present:

1st. The dentist, as the guardian of oral

health of the community, can no longer disregard preventive measures as a part of daily practice.

I am in full accord with that.

2d. The prevalence of dental caries should be minimized by systematic oral prophylaxis under the direction of the dentist.

I agree with that, but by himself and not by a hygienist.

3d. If the burden of other professional duties prevents the dentist from giving this service, he should provide adequate assistants.

Naturally, but nothing short of the licensed dentist or a hygienist trained on an equal basis of education.

4th. The dental hygienist should be properly trained and regulated by law.

She does not need any regulation when properly trained, except the regulation that you have. She is entitled to go her way and look out for herself.

Wherever she has been given opportunity, she has met all expectations.

Right there we part, unless the Doctor will define what the expectations are. They are indefinite to me just now. As a business and financial assistant to her employer no doubt she has in most cases met expectations; as an aid in public health work or education, she has failed. Few have entered this field, where the need is great.

5th. Whether she labors in private office or public institution, she is rendering humanitarian service.

We differ on that point of humanitarianism. I should not consider myself much of a humanitarian at so much per hour; perhaps he does. I think that the work is hard and difficult and sometimes I am rendering a service to humanity, but I am being paid for it. It is the way I chose of making a living. The idea of doing this solely for the public good is all very nice, but the sponsors of the dental nurse have not yet arrived at that point.

The dental hygienist is an important factor in dentistry to the one who super-



vises her activities and collects her earnings. If she is educated properly and meets State Board standards, I hope we shall not undertake to supervise her activities, and if not educated and qualified, we should not have her at all.

I have tried to present this subject as I believe, and as I believe that eighty-five, yes, ninety per cent. of the profession feel, that any short-cut specialist to operate in the mouth is an insult to the dental profession.

**Dr. Thaddeus P. Hyatt**, New York City. *Mr. President and friends*,—I am very pleased to meet Dr. Barrett this evening and I am heartily in accord with him when he says we should not allow personalities to enter into the discussion. We should be big enough not to accuse anyone of selfish motives.

As he presented his ideas on the subject tonight Dr. Barrett spoke as strongly and as well as he was able to do in upholding views that are being held by a fast diminishing few. We may both be mistaken, but we are not blackguarding one another and that is a big step in advance.

Dr. Barrett has an unfortunate way of confusing things. He does not believe in a dental hygienist in one breath and in the next says if she receives the same education as the dentist he would believe in dental hygienists. But if she has four years' training in a dental college we would not call her a dental hygienist, but a dentist. Therefore there would be no dental hygienists, yet Dr. Barrett says under certain conditions he believes in them. This is almost as bad as his comments upon the use of the words "nurse" and "hygienist."

Dr. Barrett says: "Anyone at all familiar with the definition of the word nurse or nursing, would not apply either to that work, nor would one familiar with the word hygiene, coin the word hygienist and thus apply it."

When a person stands before an audience and tells them certain words are being incorrectly used, it is but natural to assume that the speaker is informed as to the correct meaning and usage of the words criticized.

I will admit right here that there is a lot about words I do not know and there are a lot of words I do not understand, so when Dr. Barrett questioned the correct use of these words I at once went to several dictionaries and studied the different definitions. These are a few of the definitions given in any of the standard dictionaries:

*Nurse*: One who nourishes, tends, brings up a person, especially a woman, who has the care of the sick or infirm. One who brings up, causes to grow, trains, fosters.

The nurse of manly sentiment and heroic enterprise.

One who ministers, who gives aid, relief, to give new life to, to help, to re-inforce, to promote, to speed, to support, sustain, uphold, to serve, do service to, to wait on, to take care of.

Therefore the *dental nurse* is: The nurse of oral hygiene and dental prophylaxis.

*Hygiene*: Preservation of health, maintenance, support, conservation of, preserves, maintains, keeps, sustains, to save, to nurse, to make safe.

*Hygienist*: One who studies or is versed in the principles of hygiene or the preservation of health.

Therefore: A dental hygienist is one who studies or is versed in the principles of dental hygiene and dental prophylaxis.

Could you want a better word? Yet Dr. Barrett tried to ridicule this big movement, this big ideal—tried to ridicule it by posing as one who knew something about words. He posed as a man who understands words. He said that if they knew the meaning of these words, they would not use them. I should like you to tell me if the words are not good words to use. That is the way many of Dr. Barrett's so-called arguments go.

I love truth more than fame and so shall have to deny for myself and my friends who advocate the dental hygienist the distinguished honor of having "coined the word hygienist."

If you will read in the DENTAL COSMOS what Dr. Barrett said before the State Society you will find it is very much the same as what has been said tonight. No argument, little logic, and many attempts to mislead you, as was

done in criticizing the use of certain words. Another example was seen to-night—you were warned to look out, that our arguments would bring in the names of some of the men who are called, the great Dr. So-and-so. You would be told the great Dr. So-and-so agrees. The great Dr. So-and-so says this, and you would then be asked to give up your ability to think for yourself and accept this or that just because the great Dr. So-and-so says so.

My friends, I don't like that. Did you notice that Dr. Barrett refrained from mentioning any names? Now just let us stop a moment and reason this out. How does a man in our profession gain fame? Who are the men in our profession whom you would name to yourself as deserving the title great Dr. So-and-so? How did he earn this title? I will tell you. By working for his profession. By studying year after year, and then sharing with you, and with me, and with every member of his profession the results of his labor. And you know and I know that such men deserve and have our confidence and that their opinion upon any dental question is of value and has weight. Then why did Dr. Barrett speak this way about the great Dr. So-and-so? It was done to mislead you. He thought Dr. Stevenson or I would bring in the names of some of the great men in the dental profession. But it is unnecessary, because all the really great men in the dental profession are in favor of the dental hygienist.

My friends, some years ago when I went before the Executive Council of the New York State Dental Society upon this question, I told them that either the dental profession must formulate the laws and control the situation or else the entire question would be taken out of their hands and be controlled and regulated by the State Department of Health or some other political organization.

It is a situation that confronts you and *not* a theory.

Read the report of Dr. Fones telling of the work in Bridgeport. This shows a reduction of thirty-three per cent. of cavities in the mouths of the school chil-

dren and a wonderful reduction of children's illnesses.

It is usual and customary for an essayist or one taking the affirmative side of a question to be given the opportunity to close the discussion. This is done, so as to enable him to answer any of the arguments used against, or objections made to, his position. This privilege was afforded at the State Meeting to Dr. Barrett. How did he use it? Of the fifteen persons who discussed his paper, fourteen agreed with him.

It is hardly necessary to repeat what each of the men who agreed with Dr. Barrett said—enough to say that Dr. Barrett returned the compliment and agreed with those who agreed with him!

But there was one shining light whose intellect could not be befogged nor muddled by the inconsistencies and the poor logic of this presentation of things that were not, and are not, and he arose and said:

If we all thought as Dr. Barrett does, it would be the last of the dental hygienist; but very fortunately for the dental profession and the future generations this is not the case. . . . those dentists who favor such action are those who have at heart the best interest of the dental profession, their patients, and the future generations, and their motives are not as Dr. Barrett has claimed, for financial reward. I take most emphatic exception to Dr. Barrett's statement that our interests are not for the common good.

Here was the only person who gave Dr. Barrett any reason for closing the discussion and the opportunity to prove himself right and this gentleman wrong. How does Dr. Barrett take advantage of the opportunity? This is his reply:

With reference to Dr. Miller's remarks he evidently did not listen very well to what I had to say or he did not understand it. He charges me with saying so many things that I did not say that I shall not attempt to answer him, but leave that to the dentists hereabout to discuss with him after I am gone.

I do not blame Dr. Barrett's wanting to get away first.

Why should we be afraid that the hy-



gienist will plan to enter our field in opposition to us? The medical nurses do not interfere with the work of the physicians. They did not at one time have medical nurses. When they started to agitate the question of legalizing medical nurses, there was a tremendous uproar raised by people who said things would happen which time has proved have not happened. The medical nurse is under the supervision of the physician absolutely, and she does not come into opposition to him in any shape or manner. So it will be with the dental nurse. She does no operation except cleansing and polishing the surfaces of the teeth. All these students practice on a manikin to learn prophylaxis and work many more hours than is required of any dental student. This is why I had to teach all the dentists who first came to the Metropolitan Dental Clinic how to give a prophylactic treatment. What was the great trouble that I had with the dentists? They wanted to be doing something else. One of them said, "Doctor, this is 'rotten.' I am qualified to extract these teeth. Can't I do it?" I should be sorry for the dental graduate who would be content to do nothing but prophylaxis for the rest of his life. With the dental hygienists, that is their work. They do not want to do anything else. Two of the graduates of Columbia came direct to our clinic; two went into private offices but left and are now with us and will never go back to private practice.

I claim that the dental hygienists do good. I cannot make that statement too emphatic; and I think Dr. Barrett's argument that he would withdraw his opposition to dental hygienists, if used in public schools and other public work, and not in any man's office, is not a good one. If they can give proper prophylactic treatment, I am entitled to have one of them for the benefit of my patients. I am in favor of the dental hygienist. The law regulating the matter provides that she shall have a certain amount of education before studying. Dental hygienists should be under the supervision of the dentist at all times.

**Dr. Alfred P. Lee, Philadelphia.** I wish to thank Dr. Stevenson for his able presentation of the subject from his viewpoint. I want to ask him to state what the pending legislation in Pennsylvania, to which he alluded, is.

There is one phase of the situation that I wish to leave in your minds: It has always interested me to note the avidity with which the quacks and advertisers seize upon the idea of the oral hygienist. At Harrisburg tomorrow the White Dentists Company are to be heard in their application for a charter to practice dentistry. In Pittsburgh they are already working. I have here a newspaper illustration recently published in a Pittsburgh paper in which this firm picture their dental achievements. They state that they are employing oral hygienists and trained dental nurses. They are practicing in violation of the laws of the State. This firm, too, is among those making an application for a new State dental society. The application is for a charter for a corporation called the Dental Welfare Society of the State of Pennsylvania. Several of this city's advertising firms are also among the applicants. The object of the society is "to maintain the high professional standards of education." The application is as follows:

#### NEW FIRST-CLASS CHARTERS.

JOSEPH C. MARCUS, Attorney at Law,  
615 Berger Bldg., Pittsburgh, Pa.

In the Court of Common Pleas of Allegheny County, State of Pennsylvania, ss: Notice is hereby given that an application will be made to said Court at No. — April Term, 1920, on Saturday, March 27th, 1920, at 9.30 o'clock A.M., by J. J. DeRoy, H. V. Walls, Wallace F. Salvas, David D. Hyman and Barney R. Simon, under the Act of Assembly entitled, "An Act to provide for the incorporation and regulation of certain corporations," approved April 29, 1874, and the supplements thereto, for the charter of an intended corporation to be called "Dental Welfare Society of Pennsylvania," the character and object of which is establishing among those legally and lawfully engaged in the practice of dentistry a high progressive standard of ethical professional interest, and



the education of the general public to a recognition of the supreme and vital importance of oral hygiene in preserving the health of the individual and of the community, and for the said purposes to maintain headquarters for the meeting and gathering of the membership, and for these purposes to have, possess and enjoy all the benefits and privileges of said Act of Assembly, and supplements thereto. The above application is now on file in the Prothonotary's Office.

JOSEPH C. MARCUS.

Solicitor.

Copied from Legal Journal.

I simply wanted to present this exhibit as showing how a certain type of practitioner in this State views the subject of the oral hygienist.

**Dr. Hyatt.** May I answer that question about the advertising men? I should like to call attention to one thing. I consulted two or three lawyers and found that the constitution and by-laws of the National Dental Association legalize advertising dentists, but restrict them as to how they shall advertise and says that they shall not advertise in certain ways. If you men of Pennsylvania are going to be slow about dental hygienists, do not blame the advertising men for getting ahead of you.

**Dr. H. M. Beck,** Wilkes-Barre. This is no ordinary meeting—we are here to decide the biggest question that has come before our profession for years. We are holding in the hollow of our hands the future happiness and welfare of the children of the Commonwealth of Pennsylvania and it is for you to decide whether they will develop into strong, healthy men and women or become human derelicts at ages from thirty-five to fifty from neglect of their teeth.

Is the Surgeon-General of the U. S. Army correct when he makes the statement that more men were temporarily disabled from tooth troubles in the trenches in France than by any other one cause? And remember, those were selected men. Does Dr. Strode, Chief of the School Health Division of Pennsylvania, a man who has devoted his life to child welfare, make a misstatement

when he says that the hygienist has been a godsend to the children under her care? I can say without egoism that I am familiar with most of the problems that confront our profession. Brought up in a dental office, I passed gold for Marshall Webb when I was eight years old; graduated from the University of Pennsylvania in 1888 and have been in active practice for thirty-two years. It has been my privilege to attend hundreds of dental meetings. For years the great problem at all of these meetings was pyorrhea and today it is only second to focal infections and treatment of pulpless teeth. We all know that pyorrhea is a disease of filth and neglect and we can justly attribute pulpless teeth and focal abscesses to the same cause. Is it safe to say that ninety per cent. of the pyorrhea and eighty per cent. of the pulpless teeth would have been prevented if only oral hygiene had been taught to the children along with their A B C's and the multiplication table? We get together and pat ourselves on the back and talk about the wonderful advances dentistry has made. Mechanically, yes. How much nearer are we to the solution of the problem of dental caries than we were fifty years ago?

Last November Dr. Edward Martin, Chief Commissioner of Health of the Commonwealth of Pennsylvania, held a health meeting in the city of Wilkes-Barre and every department of medicine was represented except dentistry! In the evening a dinner was given for Dr. Martin to which I was invited and asked to talk for five minutes. The subject of the talk was "Community Health and the Oral Hygienist." You all realize that there can be no such thing as individual health and that community health is impossible if the mouth is the most active source of contagion and infection. You must realize that the health of the community is largely governed by the condition of the mouths of the people. Millions of dollars are spent by the Government to inspect food and to see that the people are given pure food. Owing to the filthy condition of the mouths

most of this food is contaminated as soon as it touches the lips and I asked Dr. Martin if my statements were correct.

Doubtless God could have made a better man than Dr. Martin, but doubtless God never did. Dr. Martin got up and made the finest address on mouth hygiene and health that I have ever heard. I wish we could place a copy of it in the hands of everyone who has the interests of his fellow men at heart. Dr. Martin closed with this statement, "Send me ten hygienists as soon as possible for the welfare and education of the people of Pennsylvania." The medical profession is wide awake to the importance of oral hygiene as a public health measure and also to the fact that the dental profession is numerically unable to cope with the situation. They know the oral hygienist has proved her worth wherever she has been tried and they cannot understand our hair-splitting attitude. The opportunity is here to move onward and upward. We have accomplished great things in the past, greater activities and achievements are ahead. Why can not we all realize it and take advantage of it?

About fifty-five years ago my father advocated the filling of children's deciduous teeth at a meeting of the Susquehanna Dental Society. The discussion ended in a miniature riot. It is most interesting to read the minutes of that meeting. They had in those days as we have today, men who try to sprag the wheels of progress. Undoubtedly if the old practitioners who opposed the filling of children's teeth fifty-five years ago could come back and attend this meeting they would act as one man trying to water-log the oral hygienist movement.

**Dr. Albert H. Stevenson** (in closing). I do not think that there is very much that I need to reiterate, but I should like to answer one or two of the questions. I particularly want to refer to Dr. Barrett's discussion, and one or two questions that he asked. In the discussion of the paper, he used the words, "my opinion" many times, and also the expression, "I have not changed my mind from the beginning," which indicates prejudice. I have, for a purpose, re-

frained from giving you my opinions. I confined my paper to an authenticated history, none of which has been in any way denied by any discussor.

In my letter asking Dr. Barrett to criticize my paper, I wrote, "I am glad to learn that you are coming to Philadelphia, because I believe that we agree on the essentials, but differ only in the rest." I think, that I can appreciate Dr. Barrett's view. When you consider that the majority of the statistics I have given tonight were new to Dr. Barrett, you can readily understand why he spoke against the project. The material was inaccessible to him. If he had had the information, he would not have made these statements.

Regarding the time of training, I think I did not commit myself by stating that I believed one year of training would be enough. Dentistry is advancing. We have a four-year course in dentistry now. In the not far distant future I think the standards will have to be raised.

What did Dr. Barrett say that a dental hygienist was? I do not call her a dental specialist; I call her the sanitary aid of the dentist. In addition to the duty of being the sanitary aid to the dentist, she gives prophylactic treatments; for how can he spare the time to give prophylactic treatments in addition to his other dental work? In public health work these would not be given by the dentist—why in private practice?

A criticism without a suggestion is never helpful. There have been forty-five hygienists registered in New York, and one-tenth is not such a bad showing. In regard to what Dr. Barrett said about humanitarianism, do you believe that you are doing a humanitarian work? If not, then you are not fit to practice dentistry. Any man who is not a humanitarian should not belong to the Academy of Stomatology of Philadelphia. To be humane means to be kind. You can be humane all day tomorrow and yet be paid twenty-five dollars an hour. Should you give that service for nothing, or are you less humane because you do it for a fee?



Humanitarianism should know no class distinctions. Where should the work begin, if it is for health? It should be done in the best way in the case of both the rich children and the poor.

About the authorities: I purposely refrained from quoting many eminent authorities in my paper. I mentioned three men (Fones, because he started the first prophylactic work in the schools; Burkhardt of Rochester, a letter from whom I quoted; and Cross, of Massachusetts) because of their connection with institutions, and gave their statements. But while I did not name the others engaged in this field, they are eminent for what they have accomplished.

As to where the hygienists should do this work and why we should supervise them: Why should the word supervise be put in all State laws? In my recapitulation, I said: "The dental hygienist is an important factor in the progress of dentistry and the elevation of her service is a matter of concern to the dental profession which shall always supervise her activities." I have visited all the schools within a reasonable distance of New York at least once a year for three or four years, and I know what the dental hygienists have done. They do a superior type of oral prophylaxis, and I believe they are restricted to the enamel surface of the teeth and do not attempt to do any other type of work. It is not lack of confidence in them that leads me to feel that they should be supervised, but because I believe the dental hygienist should always be associated with dentistry, so that her labors can be used to the greatest advantage.

If the oral hygienists are employed as sanitary aids, to clean the surface of the teeth, you will receive an income if you are entitled to it.

Education and learning of the relation of systemic diseases to foci in the mouth mean a new responsibility in your office. We know some things and there are some questions that we should study. You

have to be armed and must be further armed to meet this situation. You are going out in public service; and you are doing practical work, if you can give your patient periodical treatment every three months in the year.

Dentistry, as well as humanity, demands that these young ladies receive an education that is high enough, but not so high as to give them the idea that they are dentists. They should have training enough to know what the teeth should look like when the work is done properly.

I invite everyone who is opposed to the dental hygienist to go into private offices and see the work that these young women are doing. The ballot held tonight would then be unanimous. Would it not be an everlasting disgrace if Dr. Martin should put through the dental hygienist law rather than the dental profession? After five years, Philadelphia should have a record like Bridgeport. There is a big program contemplated by various welfare agencies, including prophylactic clinics. You must stand on one side or the other. Your State Society has gone on record against it. It is to meet soon, and we can go to it, and can make statements that I challenge anyone to contradict. You have got to make your choice. I hope and believe the action this year will be along the line that makes for progress.

Thank you for your very kind attention and interest this evening.

A vote of thanks to the essayist and the out-of-town discussers was proposed by Dr. Lee and given unanimously.

Dr. Shoemaker then made a motion that the Academy go on record as favoring the legalizing of dental hygienists in the State of Pennsylvania. The motion was seconded, voted on by a rising vote and carried.

Adjourned at 11.15 P.M.



# THE DENTAL COSMOS

A MONTHLY RECORD OF DENTAL SCIENCE.

*Devoted to the Interests of the Profession.*

EDWARD C. KIRK, D.D.S., Sc.D., LL.D., *Editor.*

L. PIERCE ANTHONY, D.D.S., *Associate Editor.*

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PHILADELPHIA, AUGUST 1920.

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## EDITORIAL DEPARTMENT

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### Hail, Pennsylvania !

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OUR readers are familiar with the campaign which has been conducted in Pennsylvania to obtain the approval of the State Dental Society of the licensing of the dental hygienist. As the result of this campaign we are pleased to announce that, at its annual session in Reading April 22d, the State Society passed a resolution approving the licensing of the dental hygienist and providing for her education and sphere of activity by appointing a committee to outline the scheme of education of the hygienist and instructed to prepare an amendment to the dental law legalizing the dental hygienist.

The resolution referred to is published elsewhere in this issue as a part of the proceedings of the State Society and is quite inclusive in character. It was a happy thought on the part of the Chairman of the State Committee on Oral Hygiene to suggest that

this committee be composed of the three leading dental educators of the State, as thus we have guaranteed proper provision for her education by men who are experienced in dental educational matters and who are thoroughly familiar with not only the needs of the public in the field of oral hygiene, but also with the purposes which it is intended that the dental hygienist shall serve. To this committee appointed by the Society and its President, we feel sure that the training of the hygienist and the framing of a law that will clearly define and prescribe her limitations can be safely entrusted.

The advance thus far made in this direction has not been gained without considerable effort and in some instances without incriminations and acrimonious discussions. The DENTAL COSMOS has from the beginning of the movement believed that it was only necessary to clearly set forth all phases of the question to have the progressive men in the profession in Pennsylvania see the light and favor the plan; and although we have been called "propagandists" and various other things, we are glad to have contributed our share in the consummation of the plan. There can be no doubt in the mind of any thinking man with proper professional and humanitarian motives at heart that the proposed services of the oral hygienist will prove beneficial to the public and to the profession, and are emphatically in line with the present-day thought and ideal of the medical profession toward the future welfare of the public as embodied in what is meant by preventive medicine.

The objection has been insinuated and intimated in rather sinister manner that the dental hygienist will "take the bread out of the mouths of dentists." We do not believe, however, that any professional man with the instincts and ideals of professionalism can possibly take such a selfish and monetary view of the question. On the other hand, viewed from even that, to say the least, restricted viewpoint, it is specious argument, for it must be admitted that if the educative function of the hygienist bears any fruit whatever, the demand for more and better dentistry must be accelerated.

The only other objection offered, so far as has come to our attention, is that the unscrupulous may take advantage of the opportunity to more or less commercialize the services of the hygienist. In answer to which we submit that the possibility of such action on the part of a few unscrupulous and unethical men in

the profession is no valid reason why our children and the public at large should be deprived of a most beneficial humanitarian service. However, we feel confident that that phase of the question will be properly safeguarded by those to whom has been entrusted the framing of the proposed amendment to the dental law.

The campaign for this advance step in dentistry, strange to say, has been more energetically prosecuted in the so-called "effete" Eastern portion of the State and the Academy of Stomatology has been largely instrumental in giving wide publicity to the movement and to the objects and ideals of this "new species of dentist," as she has been ironically termed. We publish in this issue a paper by Dr. A. H. Stevenson of New York presented before the Academy, in which he presents a careful and judicial consideration of the question from its several angles, and is a convincing argument in favor of the dental hygienist. It is such convincing argument indeed that the audience before which it was read—some two hundred of Philadelphia's leading dentists—all but unanimously adopted a resolution favoring the project, there being but three or four dissenting voices.

Now that the representative body of our profession in the State has approved the project, it is hoped that the plan for the educating and legalizing of the hygienist will go forward without interference and that those who have opposed it will lay aside their objections and use their every effort to the end that the educational program and the laws prescribing the field of the hygienist may be so perfected that she will serve the highest ideals hoped for her by all who have the interests of dentistry and the community at heart. Let us unitedly work as hard for properly fitting and prescribing the activities of the hygienist as we have for and against the movement.

There can be no doubt as to the outcome of the issue. It is not an experiment, as it has been fully tried out, and the wonderful benefits to be derived from intelligent prophylactic care of the mouths of children as well as of adults by trained dental hygienists have been amply demonstrated in numerous instances, and if the impetus thus given to the movement is properly followed up, it cannot prove otherwise in Pennsylvania.



# BIBLIOGRAPHICAL

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ORAL ANESTHESIA. LOCAL ANESTHESIA IN THE ORAL CAVITY. By KURT H. THOMA, D.M.D. Assistant Professor of Oral Pathology, Harvard University Dental School, etc. Second Edition, Revised. 185 Pages, 79 Illustrations, Boston: M. C. Cherry, 1920. Price, \$4.50.

The subject is considered under the following headings:

1. The nature of pain and fear and methods of controlling them.
2. Special anatomy of the oral cavity.
3. Instrumentarium.
4. Pharmacology of drugs used for local anesthesia.
5. Preparation of the patient.
6. Special technique of local anesthesia.
7. Ill effects, failures, accidents and postoperative sequelæ.
8. Practical application of local anesthesia in dentistry and oral surgery.

A mastery of the anatomy is one of the essentials for success in local anesthesia, a fact recognized by the author in his clearly illustrated chapter of thirty-seven pages devoted to this subject.

In the historical review in the chapter on "Pharmacology," no mention is made of Köller, to whom in 1884 is largely due the introduction of cocain as a local anesthetic, or Halsted of Baltimore who was the first to block the inferior dental nerve at the mandibular foramen in 1885.

Thoma advocates the use of Ringer's solution made with freshly distilled water as the solvent of novocain-suprarenin, and very clearly describes a

very simple form of still for those who wish to avail themselves of this refinement. He is not so clear on the more important point of sterilization of the syringe, apparently relying upon the keeping of the syringe in a jar of alcohol. He does not state the length of time contact with the alcohol is necessary in order to destroy pathogenic organisms that may have collected on the outside or the inside of the barrel of the syringe while in use. In the next edition it is hoped that some space will be given to a discussion of the objections, if any, to sterilization of the syringe by boiling each time it is used.

The section on extra-oral methods of conduction anesthesia is especially commended to those accustomed to doing major surgery of the face and jaws.

Under "Accidents" insufficient space is given to a rather common occurrence—breaking of the needle. This is a serious accident, and the only sure way of avoiding it is by the use of a heavier needle than that commonly employed.

The matter in the book conforms in almost every respect with the generally accepted teachings on this subject, and can be safely recommended as a reliable guide for students and practitioners.

R. H. I.

PRACTICAL ORTHODONTIA. By MARTIN DEWEY, D.D.S., M.D. Fourth Edition. 532 Pages, Illustrated. St. Louis: C. V. Mosby Company, 1919. Price, \$5.50.

"Practical Orthodontia" is written in an attempt to supply a want in the art

and science of orthodontia, for this branch of dentistry has been poor in textbooks for some time. The scope and aim of the work is to present a text on modern methods for the general practitioner and dental students. The author says in the preface of the first edition, "the aim of the author has been to confine his discussion to the practical side of the question rather than to the historical features. . . . Neither has he dwelt upon the histological side of tooth movement or the development of bone. . . . Mention has been made only of such appliances as would be in keeping with physiological tooth movement and bone growth."

To this end the first part of the book is given up to a discussion of the normal in the conventional manner. To help the beginner understand the ideal occlusal relations, the text is illustrated with some excellent original drawings. In fact, the book is rich in illustrations, for there are over seven hundred and thirty-seven figures of skulls, models, faces, and appliances which help materially to a clear understanding of the subject under discussion.

In the chapter on "Etiology" the factors are divided into two groups, first as to time, into inherited, congenital, and acquired causes; and second, as to manner, into general or constitutional, and local causes. Under general causes are grouped the diseases of childhood, syphilis, rickets, tuberculosis, faulty development of the child, and faulty metabolism due to faulty germ origin. The constitutional condition is divided into three periods. The third period, the environment in which the child has lived, is especially emphasized, and the effects of diet, disuse, ductless glands, and early feeding are discussed.

The chapter on "Etiology" is well worth reading, for many important points are brought out which may help someone to explain a failure or prevent a blunder. The author gives fair warning to those who would treat a case when he says: "In making a prognosis of these conditions it is well to be on our guard and not make too positive a statement as to what can be done in the treatment of malocclusion, for very often the malocclusion is the result of a constitutional condition that at the present time may be beyond the control of even internal or general medicine." Or, in other words, even exceptional technical ability will not prevent a failure to get a result under these conditions.

The chapter on "Regulating Appliances" begins with a fine definition of an orthodontic appliance: "A regulating appliance is a mechanical device for the purpose of exerting force upon malposed teeth, in turn creating cell activity and thereby causing the teeth to assume a proper position in the line of occlusion." This is one of the keynotes of modern orthodontia and is strictly in keeping with the purpose of the author to present appliances for physiological tooth movement. It is difficult though, for the reviewer, to reconcile physiological tooth movement with some of the appliances illustrated. Certainly large and bulky arch wires, that stand a considerable distance away from the teeth, must interfere, at least, with the functions of the lips.

For those who are more experienced in orthodontic technique, the removable lingual arch of Mershon is described. It is regretted that the illustrations do not show the construction of this valuable apparatus in more detail. "The author believes that for the orthodontist who

has mastered mechanical principles and is skilled in orthodontic technique, the lingual arch used with the wire-stretching pliers offers many advantages and possibilities." Hence, this appliance and particularly the technique of wire stretching, which constitutes the major addition to the fourth edition, receives considerable attention. The high labial arch of Lourie also is a welcome addition to this edition, since it "is an easier appliance to manipulate and one that is inconspicuous and offers advantages in many cases."

Although the book is not intended to present the historical side of the subject, yet it seems almost impossible to describe appliances without, at least, some mention of the steps that have been taken in the development of these devices. Therefore a little of the history is introduced, particularly in the chapter on the Jackson appliances. The latter are introduced because they "embody mechanical principles that should be understood by all who are interested in the practice of orthodontia."

The chapter on "Treatment" is a series of case histories of the three classes of Angle, most of which were treated with the labial expansion arch; some with the high labial arch; and a few with the lingual arch. The latter receives high indorsement by the author. On the treatment of cases with missing teeth a broad

view is taken. It seems strange that there is an omission of a discussion of the proper time to institute orthodontic treatment, as well as a discussion of the desirability of early recognition of malocclusion. These are certainly practical questions which the dentist and the orthodontist must face.

The ideal textbook on orthodontia has yet to be written, and it is perhaps too much to expect that one book can ever cover the subject adequately, or that one phase of it can be presented adequately at this time. The main reason for this is because the subject is too large. Besides that, the subject matter lies buried in the substance of several texts on related subjects, and scores of magazine articles. On the other hand, old theories are breaking down under the strain of an added experience and more definite knowledge, faster than the new can be formulated and presented on a solid scientific foundation. Nevertheless this is the only modern text on the subject, and as such is a valuable addition to the dentist's library. Many fine ideas are expressed clearly on important practical orthodontic questions thus making the work a valuable reference book. This is its chief value to the orthodontist and the advanced student. It is the only modern text the dental student may turn to.

A. L. M.



## PRACTICAL HINTS

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This Department specially welcomes the brief presentation by our readers of any novel suggestions or methods which in their own practice have proved to be time-saving or to possess other features of advantage.

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### Casting a Richmond Using Steele's Facing.

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By JOSEPH HOMER, D.D.S., Boston, Mass.

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GRIND the facing and backing to fit the root end in front, sloping up to form a clearance of a thirty-second of an inch in the back. The pin should be about one-sixteenth of an inch longer than the canal, serrated, and the projecting end beveled from the facing. Oil the end of the root, mold inlay wax over it and melt to end of the pin. Melt an appropriate amount of inlay wax to the backing, oil the gingival end of the facing and heat

it enough to soften the inlay wax on the root when both are forced to place. The wax on the root may be softened with a spatula immediately before forcing the facing and backing to adjustment. Unite the two portions of wax with a hot spatula, chill, remove and carve the wax; then remove facing, invest the carved wax base and backing and cast.

87 MILK ST.

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### Should Pulpless Teeth Be Extracted?

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By H. JAS. MORRIS, L.D.S., Sheffield, Eng.

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IF all pulpless teeth are to be extracted, as many physicians think, then indeed is humanity face to face with a very grave condition.

The loss of two or three molar or premolar teeth in early youth begins to show its effects at about the age of thirty-five, and from then onward small dental "accidents" of all sorts are apt to increase, such as dislodged fillings, crowns, broken dentures, etc., due almost without ex-

ception to the fact that antagonizing natural teeth are failing to withstand the stresses of mastication for want of full mutual support.

Often the last molar becomes loose and the last but one is found to be in a similar condition, but not quite so pronounced. The posterior teeth move forward and the "bite" closes, and then the tragic process becomes accelerated by the upward and forward drive of the lower

incisors behind the uppers. The teeth are loosened and lost one by one, until only the lower incisors are left, and I think that condition is almost worse from the prosthetist's point of view than to be completely edentulous.

Nor is this the end of the story, for now a complicated disharmony sets in between the two jaws themselves, and between them and the face. The disharmony tends to increase, and no dental art that I know of can fully rectify it. Whether partial dentures and large bridges accelerate or retard the process in its incipient stages I am unable to say.

Small strong bridges will hold back the forward drift of posterior teeth and postpone the fateful closure, but then bridges usually imply death to their abutments.

The facts appear to be that the dental arches are designed in a condition of

perfect equilibrium, with no power of recovery in case of disease or losses. The individual teeth are all keystones, excepting the third molars, which combine the functions of a foundation stone and a lock nut, and are of vastly greater importance than is commonly supposed either by dentists or their patients.

My observation is that the early loss of a few teeth is likely to end in a prematurely senile face twenty or thirty years later in spite of any dental art or science at present in existence, and the sacrifice of pulpless teeth will but hasten the end of the others through overstrain.

A physician remarked to me recently that "dead" teeth were not worth the risk of arthritis, anemia, etc., but I doubt if he realized what the loss of such teeth implies as I see it.

ORCHARD CHAMBERS, CHURCH ST.

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## A Protective Tip for Steele's Facings.

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By D. RUSSELL PARSONS, D.D.S., Huntington, W. Va.

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SELECT the Steele facing and grind off the incisal edge. With a knife-edge stone, finish cutting the slot in the facing through to the incisal edge, to enable the facing to slip off of the backing gingivally. Place the facing on the backing and build up the incisal edge with inlay wax, set sprue, remove facing gingivally, invest, cast, replace facing, articulate, remove facing gingivally, invest, solder bridge, cement the facings to place, and set the bridge.

*Advantages.* 24-k. protective tip; inlay effects; eliminate checking; more perfect adaptation between protective tip and facing; more sanitary (no secretions

between facing and protective tip, facing and backing, such as are always found present in pin-tooth bridges); no dark line between the protective tip and facing (such as are found in pin-tooth protective tip methods, caused by imperfect adaptation, solder and secretions); more perfectly built and *contoured* protective tips; minimum loss of gold in the finishing.

Richmond crowns may be made by this method, by soldering the lingual surface with the facing *in situ* with little or no danger of checking the facing.

## REVIEW OF CURRENT DENTAL LITERATURE

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[*Dental Record*, London, January and  
February 1920.]

**Notes on Pressure Cast Plates.** BY D.  
MACKINTOSH SHAW.

This article is interesting because of a number of simple and commonplace suggestions. The plaster cast, after it has been thoroughly dried and while still warm (not above 110° C.) may be hardened by immersing it in melted stearin for two or three minutes. In this way the surface is hard enough to resist attempts to mark or scratch it with the finger-nail. To make the surface still more smooth and non-adhesive, it may be burnished, not merely dusted, with French chalk or pure graphite, well rubbed in by suitable brushing or by pads of cotton wool.

Properly preparing and adapting the pattern is of great importance. The ideal conditions for properly softening the wax sheet and keeping it at the best working temperature are obtained by working in a warm atmosphere. In place of this, the next best way is to soften the wax sheet by immersion in water warmed to the required temperature. Special apparatus (thermostat) may be used for keeping the water at a constant temperature. It is obvious that the larger the volume of water, the slower will be its thermal changes.

In manipulating the wax, one aim should be to preserve as far as possible the original smooth and polished surface. On the palatal surface (and alveolar) the wax when adapted should be at least as smooth as the corresponding surface of the plaster cast. Any roughness or marking from fingers, tools, folding, or overstretching must be carefully avoided. On the lingual surface, which has been subjected only to contact with the fingers or suitable tools, etc., the degree of smoothness or polish is limited only by the care and skill of the worker.

The second important aim is to avoid undue

stretching and consequent thinning of the sheet wax. This aim may be gained by "reversing the problem." Instead of accepting the problem as entirely one of stretching the wax to adapt it to the deep concavity of the plaster cast, let the wax be partly filled by adapting it to a convex reverse or "counter-die" taken in modeling composition from the plaster cast. By pressing a good-sized piece of softened modeling compound into the palate and lingual aspect of the model and flattening the top surface, we get an impression or reverse to which, when removed and chilled, the wax sheet can be at least partly adapted. Laying the sheet on the convex "reverse," it will be seen that the central area, which seemed to require stretching and be the most difficult to fit when on the model, is now the easiest portion to fit. Further, if the sheet be tilted obliquely there can be made available an actual surplus of material at and about the higher parts of the palatal vault.

In the preliminary adapting of the softened wax sheet, an endeavor should be made to distribute light finger pressure over as large an area of the working surface as possible. Keep all the fingers deftly busy at once, rather than in successive pressings or prod-dings locally. The fingers require to act somewhat like an imaginary impression tray that is continually re-adapting itself as the work progresses.

The following are variously employed to assist the fingers in manipulating the wax: chamois skin, amadou, cotton, all usually carrying warm water when applied; the tongue; suitably shaped tools of metal, wood, etc., and pieces of soft rubber. Of these that are applied warm and moist (including the tongue) perhaps chamois is the best, and cotton the worst. Chamois is useful even in the preliminary molding of the sheet wax, as it can readily be used in pieces large enough to envelop a considerable area of the sheet and so partly "swage" it towards adaptation. It



is equally useful in the finer work of fitting; chamois is smooth, soft, has considerable resilient qualities, and carries a good load of warm water.

On the lingual side, along the line where the finished surfaces of vulcanite and gold will meet, a more durable, leak-proof and sanitary joint will be secured by projecting from the wax pattern a low "skirting" wall or edge of wax to enclose (when reproduced in metal) the plate-bearing edge of the vulcanite and to produce a flush joint-surface.

In order to get a very small amount of melted wax to collect upon and flow from the extreme point of a metal tool, the tool should be heated, not at its extremity but about one-quarter to three-eighths of an inch from the end; on withdrawal from the flame, the melted wax tends to flow toward the relatively cooler extremity of the instrument (higher surface tension of the cooler portion).

The junction of sprue with plate should be so that the stream of metal does not strike the mold wall at right angles or upon any sharp or delicate corner.

If two or more sprue-formers are attached to the wax plate, they should all of them open separately into the crucible, so that each sprue becomes an independent feed-gate for the liquid metal. Shaw favors the use of three large common pins (blanket pins), with their extreme points nipped off, for sprue formers.

For the investment of the pattern, Shaw proceeds as follows: "Owing to the easily deformable nature of the wax plate, it cannot with safety be removed from the model and the entire mold made from a single mix of investment material. To make sure that the wax does not get bent or warped in transferring it from the plaster cast to the investment ring, it is rigidly supported and protected by a first layer of investment, which is applied to the exposed surface of the pattern while it is still on the model."

[*Münchener Medizinische Wochenschrift*,  
June 27, 1919.]

#### Roentgentherapy of Actinomycosis of Head and Neck Region. BY OTTO JÜNGLING.

Twelve cases (two very severe, five of moderate severity). No other treatment given except at times potassium iodid internally.

Only one death (the first case). Each actinomycotic focus was exposed at each sitting to 50 per cent. of the erythema dose; the exposure was extended 2 cm. on to healthy tissue. Three to five sittings at intervals of four weeks were sufficient. Jüngling concludes that roentgentherapy is the method of choice in cases of actinomycosis. (Cf. Heyerdahl, S. A., *DENTAL COSMOS*, April 1920, p. 551.)

[*Surgery, Gynecology, and Obstetrics*,  
Chicago, February 1919.]

#### A Theory on the Etiology of the Toxemia of Pregnancy With or Without Convulsions. BY JOHN E. TALBOT.

The theory holds that focal infection (and particularly oral) is an important etiologic factor. Talbot's article in the *Boston Medical and Surgical Journal*, April 24, 1919, is but a summary of the present one. In a series of ninety-seven cases, Talbot found evidence of chronic oral sepsis without exception. In most of the cases where a reliable history was obtainable, there was evidence of the activity of these pus pockets just previous to or accompanying the onset of symptoms. In general the severity of the toxemic symptoms may be said to be proportional to the amount of sepsis present. As illustrative, the histories of five patients are given; in four of which Talbot thought the oral infection was associated with the toxemia.

[*Les Annales Dentaires*, February 1920.]

#### Dermoid Cyst of the Floor of the Mouth. BY DOR.

CASE: Man, growth of a year's duration; no pain or inconvenience; resistant, pseudo-fluctuating, vaguely mobile. Skin and mucosa over it, normal; practically insensible to pressure. Dor gives details of the operation. The growth was not pedunculated, no adhesions, thin-walled. Contents resembled sebaceous matter; no nails, hair or teeth present. Histologically the wall was seen to consist of a lamina of connective tissue covered with cornified, stratified epithelium, very similar to normal skin, i.e., dermoid. Healing uneventful.

As in this case, the treatment of these cysts is purely surgical—extirpation, pure and simple.

[*Journal of Laryngology, Rhinology and Otology*, London, January 1920.]

**Vincent's Infection of External Auditory Meatus.** BY ARTHUR CHEATLE.

Two cases, girls about ten years, poorly nourished. Muco-purulent and offensive discharge, with Vincent's organisms. Nose, throat and gums examined, but smears only from gums showed the same organisms. Presumably the auditory meatus had been by carelessness infected from the mouth. Healing took place quickly under mercurial syringing and instillation (1:2000 mercuric chlorid). Another anomalous Vincent's infection is that reported by Dubreuilt and Jobard (*Journal de Médecin de Bordeaux*, 10 Mars 1920, p. 133). Here the infection was localized to underneath all the finger-nails (congenitally deformed) except that of the left index finger.

[*Münchener Medizinische Wochenschrift*, April 25, 1919.]

**Chronic Superficial Glossitis (Moelleri)—A Reflex Neurosis.** BY H. CHRISTIAN GREVE.

A rare condition, more frequent in women; hypochondria is a predisposing factor: at times interferes with insertion of prosthetic appliances. Greve describes one case from his own practice (woman of fifty years), complicated by the co-existence of a "hairy tongue" or *lingua nigra*. He regards this glossitis as a reflex neurosis, arising from irritation of the splanchnic by nutritional and circulatory disturbances. The anatomical path would be the connecting fibers between the ganglion *cervicale superius* of the sympathetic and the ganglion *gasserii*. Local treatment is useless, at best: attention should be centered to correct the general condition, especially gastric and intestinal disturbances, menstrual anomalies, the climacteric, and neurasthenia.

[*Journal of Experimental Medicine*, November 1, 1919.]

**Action of N-phenyl Glycineamide-p-arsonic Acid Upon Spirochete Infections.** BY WADE H. BROWN AND LOUISE PEARCE.

The dental interest in these studies lies in the spirocheticidal nature of many of the drugs advocated for Vincent's infections. The work was done upon rats and mice, infected

with the *recurrens* group of spirochetes and upon rabbits infected with *T. pallidum*. The drug was injected intraperitoneally or intravenously. The authors conclude that it is capable of exerting a very definite effect upon the course of the infections; that while it does possess a considerable degree of spirocheticidal action, its chief effect is seen in the peculiar manner in which it modifies or controls the course of the infections.

[Case Records of the Massachusetts General Hospital, April 27, 1920, Case No. 6172.]

**Tumors of the Neck: Classification.** BY E. L. YOUNG, JR.

1. Goiter.
    - A. Hyperthyroidism.
    - B. Cystic.
    - C. Neoplastic.
  2. Of infectious origin.
    - A. Chronic.
      - (a) Sepsis due to absorption from teeth, tonsils, pediculosis. Common in children especially where environment is unhygienic.
      - (b) Tuberculosis; more common in childhood.
      - (c) Actinomycosis; rare.
      - (d) Syphilis.
    - B. Acute.
      - (a) Phlegmon of neck.
      - (b) Vincent's infection.
      - (c) Mumps.
      - (d) Suppurative parotitis.
  3. Of neoplastic origin; generally in "cancer age."
    - A. Tumors of parotid (mixed tumors).
    - B. Carcinoma; arising from any of the epithelial-lined areas or from carotid gland; metastatic (on left, can come from any distance).
    - C. Hodgkin's disease.
    - D. Rare bursal and lymphatic cysts.
  4. Of congenital origin; uncommon, generally appearing in childhood or early adult life.
    - A. Bronchial cysts, always lateral (see below).
    - B. Thyroglossal cysts, always median.
- Case No. 6172, which served to introduce this classification, was diagnosed as a "metastatic epidermoid carcinoma" on the right side of the mandible in a man, aged sixty-two, associated with a bronchial cyst.



[*Transactions of the Manhattan Dermatological Society*, December 1919. *Archives of Dermatology and Syphilology*, April 1920, p. 456.]

**Gumma of the Tongue.** BY M. B. PAROUN-AGIAN.

Patient, woman, aged forty-two, lesion on tip of tongue, dorsal aspect, about size of a dime, border irregular, not indurated, duration of about three months. Wassermann, four plus. Marked improvement following neosalvarsan.

[*Dental Summary*, May 1920.]

**Cast Making.** BY D. D. CAMPBELL.

Campbell adheres to the use of shellac as a filter (two or three coats) and sandarac as a varnish for the impression.

Previous to boxing, a roll of wax about the size and length of a darning needle is placed around the impression and up to the point on it which is to be incorporated in the finished denture.

Boxing. A fairly thick mass of plaster is poured out on a smooth level surface. The impression is pressed down into this mass until the plaster touches the wax wire. With a wet spatula, shape plaster up to the outline of this wax wire. The boxing should be at least an inch thick. Trim boxing to convenient size.

The matrix, used to encircle the boxed impression, is a piece of an inner tube about 2" by 12". The lap is at the posterior portion. This matrix is held in place with a wide rubber band about 4" long.

The matrix-housing impression unit is placed in a bowl of water.

The author prefers Spence compound for the casts of full dentures, and the Weinstein compound for partials. He objects strongly to the use of plaster for casts. In a clean, dry bowl, one measure (for vulcanite, one ounce of water is sufficient; more will be required for casts upon which metal bases are to be swaged) of water and three level measures of Spence's compound are mixed together. In one-half hour the matrix may be removed and the cast trimmed. It is desirable to let the cast stand overnight before attempting separation from the impression. This is done by cutting a V-shaped fissure through the longest diameter of the

plaster down to the impression compound (in uppers) or shellac stained boxing (in lowers). The cast is then grasped firmly in the palm of the hand and with a small mallet the boxing is gently tapped toward the center.

[*Cronica Medica*, Lima, June 1919.]

**Vincent's Angina.** BY JUAN C. DIANDEBAS.

The author reports a case in which *cap-sicum annuum* seemed to act as a specific. The ulcerations were touched with a semi-fluid paste in which had been incorporated the triturated seeds of this plant. The applications at first were applied every fifteen minutes. Within thirty-six hours there was much improvement. At first there is intense salivation and rhinorrhea.

[*Lancet*, May 1, 1920.]

**Novocain Anesthesia.** BY G. H. C. ST. GEORGE GRIFFITHS.

The object of the criticisms is only to warn novices against the many avoidable pitfalls. The author obtains perfect anesthesia with 0.5 per cent. solution of novocain, to which has been added adrenalin (five to ten minims of a 1:1000 solution). This was supplemented by a hypodermic injection of scopolamin, gr. 1/150 and omnopon gr. 1/6 about fifteen minutes previous to making the incision, to make the patient dazed or extremely sleepy.

Reactionary hemorrhage is always encountered more frequently than with general anesthesia. To avoid this hemorrhage, adrenalin may be left out of the solution (the safer method) or the ligating of the smaller vessels in the area. A marked serous discharge and intense pain at the site of the operation are other local complications.

Among the general complications may be insomnia, intense headaches, thirst during the operation and flatulence the next day, retention of urine (depending partly on the roughness of the surgeon in handling the parts). Griffiths found that the number of chest complications (coughs and bronchitis) were almost as great under novocain anesthesia as under general. An interesting post-operative symptom in thirty per cent. of the cases was a definite but slight tint of jaundice of the conjunctivæ, setting in on the second day after the operation.



# OBITUARY

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## Dr. Charles M. Bailey.

[SEE FRONTISPICEE.]

DIED, at his home in Minneapolis, Minn., June 12, 1920, from the infirmities of old age, CHARLES MONROE BAILEY, D.M.D.

Dr. Bailey was born at Portland, Me., December 4, 1843. When a young man he engaged in the practice of dentistry, subsequently entering the dental department of Harvard University in 1871, from which institution he received the D.M.D. degree.

Dr. Bailey was the oldest practitioner of dentistry in Minnesota. He founded the first dental society in the city of Minneapolis, and was a charter member of the Minnesota State Dental Association. On the 50th anniversary of his entry into the practice of dentistry a testimonial banquet was tendered him by the dentists of the Northwest, at which time he was presented with a watch suitably engraved to commemorate his work. At the same time he was presented with a round-trip ticket to California, together with a liberal allowance for necessary expenses extending over a period of six or eight weeks.

He gave freely of his great knowledge and his great humanitarianism not alone to his profession, but to the community in which he dwelt. He was a busy man who could always find time to hold out a helping hand to any who might need assistance. He has built a monument in the hearts of those who knew him for his wisdom, kindness and efficiency, and was much loved and respected.

A volume would be necessary in order to tell the full measure of his activities and it is probably true that he has exercised a more potent influence upon dentistry in the Northwest than any other individual.

To me personally, he has been a continuous source of inspiration, and it is one of the greatest honors that has ever been conferred upon me to have had the privilege of serving under his leadership.

It may be truly said of him that he gave

his all to and for his profession and will be long remembered in the annals of Minnesota dentistry.

Dr. Bailey was a prominent member of the First Congregational Church of Minneapolis and was always active in its affairs. He was a member of Cataract Lodge A. F. and A. M., and for many years was identified with the college of dentistry which he helped to found and of which he was secretary. This college subsequently became the dental department of the University of Minnesota in which he filled the chair of Prosthetic Dentistry and of Orthodontia. He resigned this position in this school in 1896, devoting himself thereafter to his practice which he was forced by ill health to resign about two years ago. He practiced in all fifty-six years.

Dr. Bailey was married in 1876 at Machias, Me., to Laura Longfellow, who died in February 1878. He is survived by one son, Campbell B. Bailey, and a sister, Miss H. Louise Bailey, both of Minneapolis.

F. B. K.

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## Dr. William Pliny Dickinson.

DIED, November 21, 1919, in Portland, Ore., WILLIAM PLINY DICKINSON, D.D.S.

Dr. Dickinson was born May 31, 1842, in Walpole, N. H., three years before his father went west and established himself in Dubuque, Iowa.

In May 1864 he entered the office of Dr. E. L. Clark, in Dubuque, as a student of dentistry. He was more studious than most young men and read all the professional books he could buy or borrow. While in Dubuque he became one of the most useful and influential men in the Iowa dental profession. He was twice president of the State Society, in 1880 and 1886, twice appointed on the State Board of Examiners, and secretary of the board. In 1883-84 he attended the Pennsylvania College of Dental Surgery in Philadelphia and received the degree of D.D.S.

Dr. Dickinson was a man of unusual ability, high ideals, and force of character, and deserves more than a passing word or two of remembrance.

In 1890 Dr. Dickinson removed to Minneapolis, where he was soon drawn into the teaching staff of the University of Minnesota, Dental Department, and later served as Dean for a number of years. The fifteen years in Minneapolis were most fruitful in service to his profession, bringing greater numbers of students and practitioners under the influence of his character, his instructions and wise counsels. After resigning the deanship in the school, his eyesight began to fail and for a time he gave up professional activities and he and Mrs. Dickinson lived with their daughter in Alabama.

An operation having restored the sight of one eye, he returned to Minneapolis, but re-

moved to Portland, Ore., in 1910. He became professor of therapeutics and pathology in the North Pacific Dental College and continued in that service until the breaking down of his health, about a year before his death.

He was at one time vice-president for the West of the National Dental Association. He was a prominent Mason, a greatly esteemed member of the Delta Sigma Delta Fraternity, and a beloved comrade of the Grand Army of the Republic.

In April 1864 Dr. Dickinson was married to Miss Mary Lee Jones, daughter of Rev. Teodor Jones, a Welsh clergyman of Dubuque, who died two years later.

In 1871 he was married to Miss Evaline S. Robinson, of Auburn, N. Y., who survives him, with two daughters, their husbands, and eight grandchildren.

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# ARMY AND NAVY DENTAL NEWS

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## Army Dental Corps.

### *Examinations for the Army Dental Corps.*

EXAMINATIONS are in progress to fill the limited number of vacancies in the Army dental corps created by the provisions of the Army reorganization act of June 4th. The lack of opportunity for promotion in this branch is due to the fact that the corps is over-officered, and it will require some time to absorb the surplus. Promotions, however, hereafter are based on length of service in all grades, and the only officers who are eligible for advancement to September 9th are eighteen in number, from the grade of first lieutenant to captain. These are Lieuts. H. C. Feyler, E. M. Kennedy (on account of previous contract service), G. M. Krough, W. W. Wooley, J. B. Mann, B. M. Epes, and H. E. Guthrie (these five on account of National Guard service), G. J. Sibley, C. J. Denholm, J. H. O'Reilly, W. H. Siefert, J. H. Jaffer, F. P. K. Barker, C. B. Parkison, J. H. Keith, J. J. Weeks, F. E. Rodriguez, and T. M. Page. Within the last eight months thirty-nine regular officers have resigned and three have retired, leaving 101 vacancies to

be filled by examination. There are 197 officers in the regular corps, which is entitled to 298. The new appointees will be from among those who served as temporary officers during the war. For the purpose of examination for promotion, boards are in session at the Walter Reed General Hospital in Washington, Fort Sam Houston, the Letterman General Hospital in San Francisco, Manila, and Coblenz.—*Army and Navy Register.*

## Assignments.

### Army Dental Corps.

#### *Week ending June 12th.*

Maj. Donald W. Forbes from Hawaiian Department to United States and report.

Maj. William A. Squires to Camp Dix, N. J., for duty.

Capt. William S. Shuttleworth to Fort Leavenworth, Kans., disciplinary barracks for duty.

Resignation by Capt. Edward A. Thorne accepted.

1st-Lieuts. Charles Wallach, Frank W. Fenzel, Albert G. Coffey, honorably discharged.

*Week ending June 19th.*

Capt. George A. Cloutier, Jr., report by wire to commanding general Northeastern Department for assignment.

Capt. Milton A. Price to Dayton, Ohio, McCook Field, for duty.

Capt. James B. Eastman and 1st-Lieuts. Oscar R. Reed and John P. Cooper, honorably discharged.

*Week ending June 26th.*

Maj. John W. Scovel from general hospital 2, Fort McHenry, Md., to Western Department for assignment to duty and station.

*Week ending July 3d.*

Maj. Thomas L. Smith from duty at general hospital 31, Carlisle, Pa., to Fort McPherson, Ga., general hospital 6, for duty.

Maj. Nathaniel Barnard, Capt. William F. Blair, 1st-Lieut. Edwin C. Osborn, honorably discharged.

Capt. Conrad E. Mortensen, having been absent without leave since August 13, 1919, is dropped from the rolls of the Army.

**Navy Dental Corps.***Week ending June 12th.*

Lieut. Wm. R. Taylor, detached from receiving ship at New York, N. Y.; to naval training station, Great Lakes, Ill.

*Week ending June 19th.*

Lieut. Charles S. Weigester, detached from naval dispensary, Washington, D. C.; to marine expeditionary force, Santo Domingo.

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# DENTAL COLLEGE COMMENCEMENTS

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## Philadelphia Dental College (Temple University).

At the annual commencement exercises of Philadelphia Dental College (Temple University), held in Philadelphia, Pa., the degree of Doctor of Dental Surgery was conferred on the following graduates:

Francis J. Curran	Charles D. R. Halstead	David W. Kramer	William M. Shawmut
Maxwell T. Dahlen	Philip H. Holstein	Carlos A. Mendiola	Thomas W. Shearer
Regina David	Isaac P. Holzman	Alfred F. Pierson	Maurice I. Tubinsky
Vernon T. Emmons	Ralph A. Howard	David Rosenberg	Harry A. Weiner
Morris O. Fineman	William J. Kennedy		

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## Baltimore College of Dental Surgery.

At the annual commencement exercises of the Baltimore College of Dental Surgery, held in Baltimore, Md., June 14, 1920, the degree of Doctor of Dental Surgery was conferred on the following graduates:

J. Barrett	Long Island	J. A. LeBlanc	Canada
F. Bolivar	Central America	Wm. Lipkowitz	Pennsylvania
H. Braslavsky	Pennsylvania	W. V. MacDermott	Pennsylvania
J. J. Brominski	Pennsylvania	E. J. McKeon	Massachusetts
A. H. Collette	Massachusetts	J. L. Martinez	Central America
J. W. Cormier	Canada	J. F. O'Connor	Massachusetts
J. C. Costen	Virginia	H. H. Ramsey	West Virginia
L. F. Cumming	Canada	H. H. Rodden	New Hampshire
P. S. Del Valle	Cuba	E. W. Schoonmaker	Massachusetts
F. K. Dobson	Connecticut	F. Umpierre	Porto Rico
G. D. Estabrook	Maine	J. M. Ward	Maryland
A. B. Kelly	Ireland	G. N. Yates	New York
F. Lares	South America	S. Zinman	Connecticut



### University of Illinois, College of Dentistry.

At the annual commencement exercises of the College of Dentistry of the University of Illinois, held in Chicago, Ill., the degree of Doctor of Dental Surgery was conferred on the following graduates:

Salvator P. Di Cosola	Louis Koppel	Ernest Malter	Harvey Stallard
Lionel N. Drues	Shozo Kurachi	Didrik Sannes	Clarence Toline
Emily H. Kayla	Age Maits	Louis W. Schultz	Oscar B. Yeatman

### Vanderbilt University, School of Dentistry.

THE annual commencement exercises of the School of Dentistry of Vanderbilt University were held on May 25, 1920, in Nashville, Tenn. An address to the graduates was delivered by Rev. Allen Fort, D.D.

The degree of Doctor of Dental Surgery was conferred by Chancellor James H. Kirkland, A.M., Ph.D., LL. D., on the following graduates:

Homer A. Akin	Tennessee	Yasumasa Nakayama	Japan
Alfred C. Bowman	Texas	Nicholas P. Perri	New York
John R. Manz	Indiana	William J. Watson	Arkansas

### Thomas W. Evans Museum and Dental Institute School of Dentistry University of Pennsylvania.

THE annual commencement exercises of Thomas W. Evans Museum and Dental Institute School of Dentistry University of Pennsylvania were held on Wednesday, June 16, 1920, in Philadelphia, Pa., at the Metropolitan Opera House.

The degree of Doctor of Dental Surgery was conferred by Edgar F. Smith, Ph.D., Sc.D., LL.D., provost, upon the following candidates:

Sherwood D. Amidon	Missouri	Julius R. Heilbron	Dutch Guiana
John A. Baldwin	England	Frederick H. Hoeffler	New Jersey
Robert R. A. Baridon	Switzerland	Laurence S. Keeler	Connecticut
David R. Bernstein	New Jersey	Harold F. McDuffee	New Hampshire
Leon A. A. Blanc	France	Charles A. Müller	Switzerland
Cyril H. Child	England	John A. O'Grady	New Jersey
Albert E. Clark	Australia	Philippe E. Paccaud	Switzerland
Salomon M. Cohen	France	Francois Renggli	Switzerland
Donaldson B. Cooper	Pennsylvania	Frank W. Rice	New Jersey
Walter H. Curry	New Jersey	Morris Rochlin	New Jersey
Paul L. J. Dondey	France	Otto Schmedes	Denmark
Robert G. Drake	Nebraska	Victor R. Schmidt	Switzerland
Per A. Engstrom	Sweden	Carlos J. da Silva	France
Harold R. B. Fenn	England	Kenneth S. Smith	Pennsylvania
Arthur J. Fitton	England	James Louis L. Soinard	France
Harold Foulkes	England	A. Storm van's Gravesande	Holland
Ernest U. Fuchs	Switzerland	James M. Turner	New Zealand
Robert M. Gillies	Australia	Frank M. Uehlein, Jr.	New Jersey
Raymond T. Glanville	New Jersey	Harold A. Van Duine	New Jersey
Louis Golove	Pennsylvania	Leo Von Moos	Switzerland
Marius Hansen	Denmark	Gittel Zweiman	New York

Degree conferred (as of class of 1919) at University Council, February 21, 1920:

George H. Blais	New York	William A. Haverkost	Pennsylvania
Jules W. Bragin	New York	Aaron Pearlman	Pennsylvania
Rees H. Davis	Pennsylvania	Louis W. Zerfing	Pennsylvania
Geneva E. Groth	Pennsylvania		

# SOCIETY NOTES AND ANNOUNCEMENTS

NOTICES should reach the Office of the DENTAL COSMOS *not later* than the 11th or 12th of the month preceding that of publication.

## Coming Dental Society Meetings.

### National Meetings.

AMERICAN ACADEMY OF PERIODONTOLOGY. Boston, Mass. August 26th to 28th.

AMERICAN DENTAL LIBRARY AND MUSEUM ASSOCIATION. Boston, Mass. August 23d.

AMERICAN SOCIETY OF EXODONTISTS. Boston, Mass. August 20th and 21st.

ASSOCIATION OF MILITARY DENTAL SURGEONS. Boston, Mass. August 24th and 25th.

CANADIAN DENTAL ASSOCIATION. Ottawa, Ont. August 17th to 20th.

DELTA SIGMA DELTA FRATERNITY. Boston, Mass. August 23d.

NATIONAL ASSOCIATION OF DENTAL FACULTIES. Boston, Mass. August 20th and 21st.

NATIONAL DENTAL ASSOCIATION. Boston, Mass. August 23d to 27th.

NATIONAL SOCIETY OF DENTURE PROSTHETISTS. Boston, Mass. August 19th to 21st.

## National Dental Association.

The twenty-fourth annual meeting of the National Dental Association will be held in Mechanics Building, Boston, Mass., August 23 to 27, 1920.

The Mechanics Building is one of the largest in the United States for exhibition purposes of every description. It is over six hundred feet in length and covers over three acres of land, containing over 150,000 square feet of floor space, and is known all over the continent as the home of the far-famed poultry, automobile, and dog shows, mechanics' and food fairs. World-renowned opera singers have entertained thousands of music lovers in the Grand Hall. Presidents and noted speakers have addressed thousands of citizens of Massachusetts in this vast hall.

The Association is indeed fortunate to secure such a building for its meeting, as it assures ample room for clinics, demonstrations, and exhibits under one roof, with facilities for taking care of ten thousand members of the profession and guests.

F. E. JEFFREY, *Chmn. Pub. Committee*,  
Salem, Mass.

## Association of Military Dental Surgeons.

THE Association of Military Dental Surgeons will hold their annual meeting in Boston, Mass., August 24 and 25, 1920.

ROBT. T. OLIVER, *President*,  
G. H. CASADAY, *Sec'y-Treasurer*,  
Presidio of San Francisco, Calif.

## National Association of Dental Faculties.

THE annual meeting of the National Association of Dental Faculties will be held at the Lenox Hotel, Boston, Mass., August 20 and 21, 1920.

C. C. ALLEN, *Sec'y*,  
10th and Troost, Kansas City, Mo.

## National Society of Denture Prosthetists.

THE National Society of Denture Prosthetists will hold its second annual meeting in Boston, Mass., in the buildings of the Harvard University Dental Department, August 19, 20, and 21, 1920. Members of the profession interested in prosthetics are cordially invited to attend these sessions.

DAYTON D. CAMPBELL, *Sec'y*,  
Shukert Bldg., Kansas City, Mo.

## Delta Sigma Delta Fraternity.

### ANNUAL MEETING.

THE thirty-sixth annual meeting of the Supreme Chapter of Delta Sigma Delta Fraternity will be held in the Copley Plaza Hotel, Boston, Mass., on Monday, August 23, 1920, at 9.30 A.M. Annual banquet at 6.30 P.M.

EDWIN T. DARBY, *Supreme Grand Master*,  
R. HAMILL D. SWING, *Supreme Scribe*,  
1623 Walnut st., Phila., Pa.

## American Society of Exodontists.

THE annual meeting of the American Society of Exodontists will be held at the Harvard University Dental School, Boston, Mass., Friday and Saturday, August 20 and 21, 1920. An interesting program has been arranged. Members interested in this branch of practice will be welcome at the sessions and those eligible for membership are invited to make application.

FREDERICK F. MOLT, *Sec'y*,  
25 E. Washington st., Chicago, Ill.

## American Dental Library and Museum Association.

THE next annual meeting of the American Dental Library and Museum Association will be held August 23, 1920, at 3.30 P.M., at the Forsyth Dental Infirmary, Boston, Mass.

At that session the official business will be taken up and a permanent constitution adopted. All societies, colleges, etc., applying before that time will be included as charter members.

Another session will be held later in the week to suit the convenience of the majority of members, when an interesting program pertaining to library and museum matters will be given.

Dr. Wm. Bebb will present a short paper dealing with methods of building libraries and museums and of conducting same.

Dr. L. Pierce Anthony, of the DENTAL COSMOS: Advisability of compiling a new dental bibliography, a standard reference list of books on dentistry published throughout the world. The last one compiled in this country was by C. G. Crowley in 1885.

Dr. B. W. Weinberger: Bibliography of Dental Periodicals published in the United States and Great Britain.

All those interested are requested to be present.

A. F. ISHAM, *President*,  
B. W. WEINBERGER, *Sec'y-Treasurer*,  
40 E. 41st st., New York City.

## National Dental Golf Association.

THE National Dental Golf Association was organized at New Orleans last October, and temporary officers elected.

The first tournament will be held in Boston on the Woodland Golf Course, Monday, August 23, 1920, during the meeting of the National Dental Association.

It is purposed to effect a permanent organization at that time. Officers will be elected, committees appointed, and suitable by-laws adopted.

It is desired that all members of the National Dental Association, interested in golf, should become affiliated. An effort is being made to supply such persons with application blanks. There is an application blank at the end of Chick Evans' article on "Why Professional Men Should Play Golf," published in the April issue of the *Journal of the National Dental Association*. Blanks may also be secured from the Secretary-Treasurer.

You should join the association whether you expect to attend the Boston meeting or not. The admission fee is \$3.00 paid but once, and no other fees will be charged except to those who participate in the tournaments.

While it is the intention of the Association to conduct an annual tournament at the time and place of the National Dental Association meeting, it is not proposed that it shall in any way interfere with the scientific program.

Any further information will be gladly furnished upon request.

F. M. CASTO, *Chairman*,  
Rose Bldg., Cleveland, O.  
RALSTON I. LEWIS, *Sec'y-Treas.*,  
25 E. Washington st., Chicago, Ill.

## Canadian Dental Association.

THE Canadian Dental Association will hold its tenth biennial meeting in Ottawa, Can., August 17, 18, 19, and 20, 1920.

SYDNEY W. BRADLEY, *Sec'y*,  
206 Laurier ave., W., Ottawa, Ont.



### American Academy of Peri- odontology.

THE annual meeting of the American Academy of Periodontology will be held at the Copley-Plaza Hotel, Boston, Mass, August 26, 27, and 28, 1920.

B. F. MILLER, JR., *Sec'y*,  
104 Dryden Bldg., Flint, Mich.

### Susquehanna Dental Association of Pennsylvania.

THE fifty-seventh annual meeting of the Susquehanna Dental Association will be held at the Hotel Sterling, Wilkes-Barre, Pa., October 26, 27, and 28, 1920.

FULLER L. DAVENPORT, *Ch'mn Ex. Committee*,  
520 Miners Bank Bldg., Wilkes-Barre, Pa.  
GEORGE C. KNOX, *Recording Sec'y*,  
Middletown, N. Y.

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## UNITED STATES PATENTS

### PERTAINING TO OR APPLICABLE TO DENTISTRY

ISSUED DURING JUNE 1920.

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#### June 1.

- No. 1,341,736, to HENRY L. CRUTTENDEN.  
Dental cement injecting tube.
- No. 1,341,813, to MELVIN E. MERKER. Artificial tooth.
- No. 1,341,916, to BASIL W. LEACH. Rotary toothbrush.
- No. 1,342,156, to ROBERT O. BRITTAIN. Dental educational device.
- No. 1,342,280, to PATRICK J. FITZGERALD. Electrically-vibrated toothbrush.
- No. 1,342,376, to SAMUEL EARP. Artificial tooth.
- No. 1,342,379, to FRANK C. GOODWIN. Tooth having an interchangeable facing.

#### June 8.

- No. 1,342,521, to KICHIBEI YANAGIHARA. Protected toothbrush.
- No. 1,342,968, to RAPHAEL J. MOOLTEN. Sanitary mouth and lip protector.
- No. 131,948, to ABRADANT PRODUCTS CO. Trade-mark for grinding and polishing wheels and grinding and polishing blocks.

#### June 15.

- No. 1,343,570, to ROBERT H. LIEBERTHAL. Toothbrush.

- No. 1,343,691, to WILLIAM M. STANBROUGH. Dental articulator.
- No. 1,343,713, to CLARENCE W. FULLER. Dental massage and polishing appliance.

#### June 22.

- No. 1,343,935, to MERRITT RICE. Method and device for producing plates for artificial teeth.
- No. 1,343,950, to GEORGE S. WHITAKER. Dental suction plate.
- No. 132,351, to A. H. DE GOENAGA. Trade-mark for toothpaste.
- No. 132,369, to NICHOLAS FARMAKIS. Trade-mark for remedy for pyorrhea.
- No. 132,493, to QUEISSER and Co. Trade-mark for creams and paste for the teeth.
- No. 132,562, to J. N. THIBODEAUX. Trade-mark for toothpowders, toothpastes and mouthwashes.

#### June 29.

- No. 132,617, to THE AUSTEN COLOGNE CO. Trade-mark for mouthwash.
- No. 132,780, to JOSEPH J. PHILLIPS. Trade-mark for toothpaste.
- No. 132,828, to MARY E. SULLIVAN. Trade-mark for dentifrice and antiseptic deodorant.





Jesse C. Green -



# THE DENTAL COSMOS

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VOL. LXII.

SEPTEMBER 1920.

No. 9

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## ORIGINAL COMMUNICATIONS

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### The Mouth as a Gateway of Infection.

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By FREDERICK B. NOYES, A.B., D.D.S., Chicago, Ill.

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(Read before the Odontological Society of Chicago, May 4, 1920.)

MR. PRESIDENT AND MEMBERS OF THE ODONTOLOGICAL SOCIETY OF CHICAGO:

**T**HIS paper had its beginning some eight or ten years ago. I was invited to Toledo to give a lecture on the structure of the enamel before the Dental Society of that city. As is customary on such occasions the members of the society met for dinner, the dinner being held in one of the restaurants of the city. As I entered the dining hall with the president of the society my host recognized an old friend dining at a table near, and as he was alone he was invited to join our party. As we were seated at the table he was placed between my host and myself. This gentleman had just returned from the Philippine Islands, where for a number of years he had been a teacher in one of the Igorote villages where the gentle art of head hunting takes the place of our golf and tennis.

Just at that time the wonderful physical perfection of these people was receiving very great attention. There had

been a number of articles written in the magazines about them, and the dental journals had contained articles describing the perfection of the structure of their teeth and their very great immunity from caries. Our guest entertained us through the meal with stories of this primitive people and their peculiar customs. In reply to someone's comment on their physical perfection he said: "Yes, they are a wonderfully perfect race, especially the young adult, but they are not a long-lived race, as most of them die between forty and forty-five. A few, however, live to be very, very old." Later on in reply to a comment in regard to the perfection of their teeth he said, that the young adult had the most beautiful teeth he had ever seen, but between thirty and forty they developed diseases of the gum, the teeth becoming loose in their sockets, and in some instances they all fall out leaving them without any teeth at all about forty or forty-five. "These few," he added, "who lose all of their teeth live to be very, very

old, but the majority of the people die of acute fevers between thirty-five and forty-five."

These statements made by a man of scientific training and evidently of careful observation made a great impression on me. There were three points in his statements: first, this primitive race is almost immune to caries; second, progressive destructive inflammation of the supporting tissues is very common, most of the individuals from thirty-five on having more or less inflammation of the gums and in many instances all of the teeth becoming loosened and falling out, and third, while most of the individuals of the tribes die in the prime of life a few who lose all of their teeth live to a very great age.

Just at that time I was beginning the study of the tissue changes and the destructive inflammation to the periodontal membrane, and in all the time since this has been one of my principal interests. While studying these tissues I had constantly in mind the story of this teacher and the question has recurred again and again, What is it in the changed condition of these tissues which renders the mouth the gateway of acute infection? While the answer to this question will not be fully made for many years to come, it is some thought along this line to which I shall invite your attention this evening.

#### SYSTEMIC CONDITIONS ORIGINATING IN THE MOUTH.

For the purposes of this paper I shall divide the systemic conditions which have their origin in the mouth into three groups. First, in childhood and youth in which the principal conditions are involvement of the lymphatic glands in the neck, tubercular or other, endocarditis, muscular rheumatism, and a variety of other conditions. The opportunity for infection is offered through broken-down deciduous teeth and destruction of the first permanent molars and the cause is caries. Inflammation and irritation of the gums in children and youths is not at all uncommon, but

at this age the condition is usually characterized by hypertrophy rather than by destruction of tissue and does not seem to be related to infection except in a limited way as offering the gateway for the infection of the acute fevers of childhood.

Second, in adult life we may recognize two kinds of conditions: (a) Those which have their origin through involvement of the dental pulp and the development of conditions around the apices of the roots of teeth. In these conditions the bacteria which produce the local pathology in the progress of the condition are progressively altered in such a way as to adapt them to the environment of other parts of the body to which they are transported by the blood stream, where they set up pathologic conditions as in the kidneys, the appendix or the valves of the heart. (b) The conditions which develop around the necks of the teeth because of destructive inflammation to the supporting tissues furnish the opportunity of entry into the system of micro-organisms which produce acute systemic diseases.

It is not our purpose to discuss at all the question as to whether pathologic conditions around the roots of teeth or in the gums around the necks of the teeth may be transmitted to other parts of the body and may be the cause of pathologic conditions, for it seems to me that any one who will with unbiased mind examine the work that has been done upon these subjects during the last few years will be convinced of the truth of the relation of these conditions to pathologic conditions in other parts of the body. However, their importance may be overestimated by some. That the teeth are a most important factor in the origin of systemic disease must I think be accepted as clearly demonstrated, but that the importance of the teeth in the origin of systemic diseases is being overestimated at the present time, cannot also be doubted, but this makes it all the more important for the dental profession to give it careful and studious consideration rather than to be carried away by inferior and hypocritical interests.



In childhood the mouth acts as a gateway to infection in three ways: First, through the opening of the lymphatic channels from the teeth to the submaxillary glands, through which channels infection reaches the glands of the neck. Second, by the harboring of streptococcus infection around the roots of the teeth, which is conveyed to other parts of the body by the blood stream, and by furnishing opportunities for the entrance of germs of the acute fevers of childhood. It was long ago supposed that the submaxillary lymphatic glands were connected by lymphatic channels with the teeth of the deciduous dentition, and that the tubercular infection of the glands of the neck so common in childhood was caused by the passage of tubercular germs along these lymphatic channels. The first investigation of the lymphatics of the dental region was undertaken for the purpose of determining whether or not a lymphatic connection existed between the teeth and the submaxillary lymph nodes. For a long time, all laboratory attempts to prove the lymphatic connection between the teeth and the submaxillary glands failed. In 1909, however, Sweitzer of Berlin succeeded in injecting lymphatic vessels in the dental pulp.

In 1914, Dr. Kaethe Dewey, working in the laboratory of the writer in the University of Illinois, College of Dentistry, repeated the work of Sweitzer, injecting lymphatic vessels in the dental pulp, and also succeeding in injecting the lymphatic capillaries of the submaxillary glands of the neck with injections through the pulps of the teeth. The continuity of these channels seemed to be satisfactorily demonstrated, and it is undoubtedly true that many of these infections of the submaxillary glands in the necks of children have their origin through the pulps of the broken down deciduous teeth.

#### CARIES THE PRIMARY CAUSE OF INFECTION.

The cause of all these conditions is caries, for it is by the destruction of the

tooth tissues and the exposure of the dental pulp that the opportunity for the infection occurs.

In regard to the extension of streptococcus infection from the roots of the teeth and the production of endocarditis, appendicitis, peritonitis, and other conditions, it is not my purpose to examine the evidence at this time. For as I have said, that infections about the roots of teeth are the origin of such infections seems abundantly proved. But again, the cause is caries. For it is the destruction of the tooth tissue and the exposure of the pulp which furnishes the opportunity for the streptococcus infection, and the establishment of the focus about the roots of the tooth.

In the third class of conditions, the acute fevers of childhood, probably the condition of the gums is of more importance than that of the pulp, and it is very probable that the tonsils and similar structures are the commonest gateways of infection. What I wish to emphasize is that if caries of the teeth could be prevented in childhood and the mouth kept in a healthy condition, then one of the most important gateways of infection would be eliminated. Even the children of our patients have often been neglected by the dentist until irreparable damage has been done, and the means of caring for the teeth of children in the great mass of our citizens has only been started. There is no greater or more important problem before the dental profession today than the development of these means of caring for the teeth of children or the prevention of caries and the maintenance of mouth hygiene. It is the dental profession that must take the lead in this and they must interest the city, the State, the county, and devise the means by which this great professional duty can be accomplished. To the professionally ambitious young dentist this field today offers a most attractive opportunity.

In adult life there is a long list of infective and suppurative conditions of various tissues and organs in which the source of the infection is from some primary focus. And that this focus is



often related to the roots of teeth cannot be doubted, but again the cause is caries and the condition which finally involves the pulp of the tooth and leads to the establishment of the primary focus at the root of the tooth began in childhood, or in youth. Instead, then, of this hectic excitement in the dental profession at the present time as to what shall be done with the focus or whether a tooth whose roots have been filled can ever be retained in the mouth, the real problem which presents itself for solution is the one of the prevention of dental caries.

#### PREVENTIVE DENTISTRY.

If the dental profession is ever to eliminate these conditions, it must change its attitude. In the past they have been chiefly occupied in mechanically repairing the damage done by caries rather than the treatment of caries as a disease. Even the system of compensation tends to exaggerate this condition. In general, dentists are paid for making fillings, crowns, bridges, plates, etc., rather than for studying the relation of the mouth and the mouth conditions to the health, vigor and activity of the patient. It is true that very great advancement and improvement have occurred in the last fifty years. In ancient times filling operations were simply plugging operations. Now, cavities are prepared not simply to restore the lost portion of the tooth but for the prevention of the recurrence of the condition, but still the attention is upon the tooth rather than upon the owner of the tooth and the thing considered is the good of the tooth rather than the good of the patient.

If for every filling that was made a certain amount were deducted from the dentist's compensation instead of being added to it, caries of the teeth as a disease and its prevention would be studied more closely. Caries is essentially a disease of childhood and youth, and most of the conditions which require the attention of the dentist during adult life have had their origin in childhood. One of the most important works of the late

Dr. G. V. Black was his study of the effect of caries upon the structure of enamel, the extent of tissue injury that occurred before a cavity is formed, and the differences in the manifestations of the disease. His studies have received very little attention from the dental profession in general.

#### PREVENTION OF PULP EXPOSURES.

The plea which I wish to make is for a study of caries as related to the patient rather than to the tooth; that the dentist should study his patient, not the teeth, and that he should strive to maintain normal conditions in the mouth, not simply for the preservation of the masticating apparatus but with reference to the health of the individual. The real question is not what shall be done with exposed pulps and pulpless teeth, but how shall the exposure of pulps by caries be prevented.

Finally, we come to the portion of this paper which has been the most interesting to me, namely, the relation of the condition around the necks of teeth which will result in the destructive inflammation of the peridental membrane and the supporting tissues offering the opportunity for the entrance of other infections into the body. In all of my studies of tissues from pathologic peridental membranes for a good many years one of the thoughts in my mind has been, what are the changes in this tissue which furnish the opportunity for the invasion of micro-organisms, so that in primitive races only those who lose all of their teeth live to great age. Before showing the conditions that I have found in pathologic specimens I want to call attention to some points in the normal structure. One of the normal functions of these tissues is the prevention of the invasion of micro-organisms. The mouth cavity is never sterile, but is usually abundantly supplied with micro-organisms. Many of them are normally commonly present, others appearing and disappearing as transient guests. In the function of mastication there must of necessity be slight injury to the mucous membrane

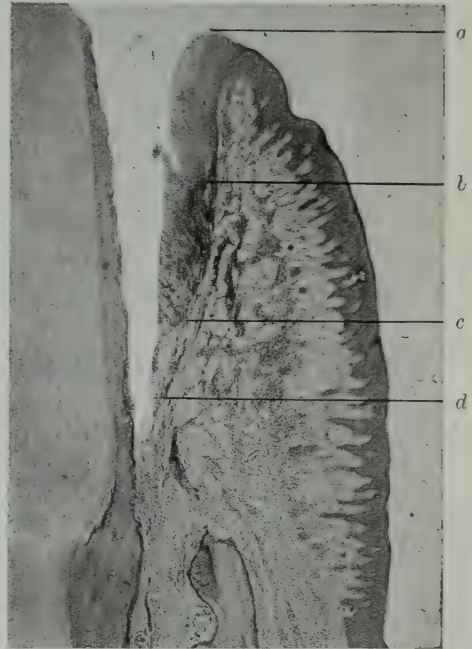
and the surface of the gums, and the free gingivæ are especially liable to such action.

There are three factors in the normal adaptation of tissue for resistance. First, a specially cellular active epithelium; second, an exceedingly rich blood supply, and, third, one of the most highly specialized lymphatic systems in the body. In a crude way we may think of this as what? In the process of mastication some micro-organisms are forced through or into the epithelium, or into the connective tissue. There is an immediate reaction in the blood circulation throwing out an increased amount of lymph accompanied by a great many leukocytes. The fluid washes the invading micro-organisms and the cells thrown out for their destruction along through the lymphatic channels and passes them through a relay of lymphatic glands before the fluid is again returned to the blood circulation. In this way the micro-organisms are removed from the tissue and destroyed before they can reach the blood stream. In a very literal sense this is a flushing system. In the normal arrangement then micro-organisms, which in the normal function must be more or less often forced into the tissues, are picked up by the lymph circulation and are destroyed before the fluid is passed through the relays of lymphatic glands which are interposed between it and the return to the blood circulation.

In the pathologic conditions which occur around the necks of the teeth in the destructive inflammation of the periodontal membrane, there must be something, then, which interferes with this normal function, and some opportunity must be given for the entrance of these invading micro-organisms, which produce the acute infection, to enter the blood circulation, where they grow and multiply in the blood plasma producing the symptoms of the systemic disease. In this condition it is not the transportation of the micro-organisms which produces the local pathology that is so great a menace to the general system, but it is the conditions in the local tissues which

are produced by the local pathology, which furnish the opportunity for the entrance of new and different micro-organisms, admitting them directly to the blood circulation.

FIG. 1.



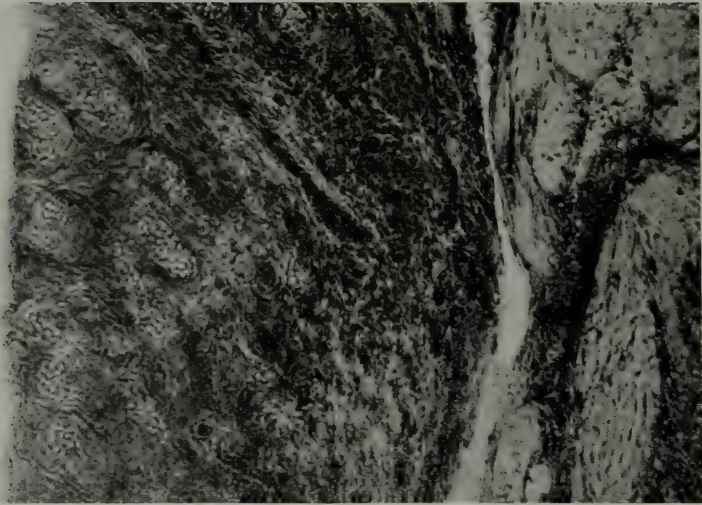
Longitudinal section through a pyorrhea pocket from a human tooth. *a*, Crest of the gingiva. *b*, Normal depth of the gingival space. *c*, Extension of gingival epithelium, capillaries, connective-tissue cells, and leukocytes—"The gateway of infection." *d*, From *c* to *d* the connective-tissue wall of the pocket has only occasional patches of epithelium. The bottom of the pocket is beyond *d*.

#### SYSTEMIC INFECTION THROUGH THE GINGIVAL TISSUES.

The conditions which I am about to show have been found more or less clearly in every specimen of tissue that has been examined. Figure 1 shows a longitudinal section through what is ordinarily called a pyorrheal pocket. The tissues should be attached to the root of the tooth at a point far beyond



FIG. 2.



The area shown from *b* to *c* in Fig 1, taken with higher magnification. On the right there is inflamed and infiltrated connective tissue. At the left of the "pocket" note the capillary tufts coming to the surface.

FIG. 3.



Another section showing the same conditions as Figs. 1 and 2 in the region from *b* to *c*.

usually is stated, the tooth has elongated. *a* is the margin of the gingiva; *b* the normal depth of the gingival space, or the point at which the tissues should have been attached to the tooth at the border of the enamel. From *b* to *c* is the area in which we are especially interested. This is an extension of the normal lining of the gingival space made up of epithelial cells surrounded by papillæ of connective tissue which are filled with round cells and a great many delicate capillaries. These capillaries reach to, or at least they are left upon the surface by the constant disintegration of the epithelium. Beyond the point *c* there are only occasional patches of epithelial cells upon the surface of the connective-tissue wall of the pocket, and there is no arrangement of capillaries as is shown in the portion already referred to.

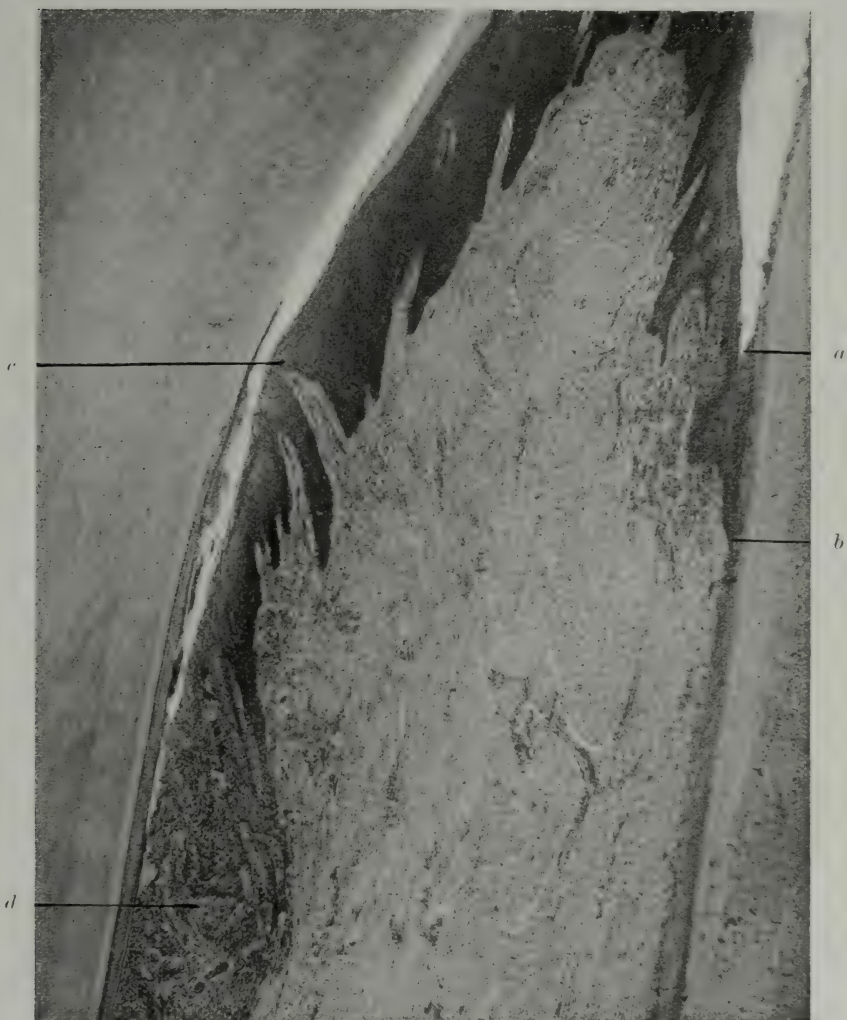
The area from *b* to *c* is the gateway of systemic infection. Here an ideal opportunity is found for the entrance of virulent germs directly into the blood circulation. They are protected in the abnormally deep gingival space where they find abundant opportunity for mul-

that shown in the picture, and all of the supporting tissues have receded, or as it



tiplication, and coming in contact with these broken capillary walls they are carriers of the active virulent germs which, whenever the general resistance is low,

FIG. 4.



Longitudinal section through the interproximal gingiva of a young sheep, showing the tissue reaction to infection. *a*, the normal depth of the gingival space. From *a* to *b* note the application of the epithelium to the surface of the cementum. *c*, the normal depth of the gingival space on the approximating tooth. From *c* to *d* and a little beyond it, extension of the gingival epithelium. The separation of the tissue from the root may be an artefact, but if so it would occur later and at the same point in the tissue.

ried directly into the circulation. As long as this condition persists there is constant opportunity for the entrance

may produce their characteristic pathology and death.

Figure 2 is a much higher magnifica-

tion of this area from *b* to *c* that shows the masses of epithelial cells surrounding the papillæ of connective tissue and the capillaries coming to the surface. Exactly similar conditions are shown in Fig. 3 from another section.

The conditions described can be shown in a great variety of forms and in all stages in material from different specimens. Figure 4 shows the very first reaction of the supporting tissues to invasion or infection of the gingival space. There is a lengthening of the epithelial projections of the Malpighian layer of the epithelium lining the gingival space, the multiplication of capillaries in the connective tissue papillæ and a throwing out of leukocytes. It has seemed to the author that this was a normal function and part of Nature's plan for the protection of the system from infections which were bound to occur in this locality, but the very mechanism designed for protection becomes itself a means of infection when the progress of the local pathologic conditions has destroyed the normal tissue relationship. This tissue then

is a gateway of systemic infection, and undoubtedly many of the acute infections which kill so many men in the prime of life gain admission to the blood circulation through these conditions.

In closing, I wish to repeat that in childhood and youth the great problem of the dental profession is the treatment of the individual patient or the prevention and cure of caries, rather than the repair of damage which has been caused by caries. The fundamental problem is not what should be done with the pulpless tooth but how can the exposure of pulps be prevented? In adult life the problem of the dentist is not merely the preservation and the maintenance of mastication, but the study of the relation of mouth conditions to the health of the individual. From the standpoint of the patient it is better to lose a tooth and save the patient than to save a tooth and bury the patient.

122 S. MICHIGAN AVE.

[See also *Discussion*, as reported under "Proceedings of Societies," this issue.]

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## Causes, Prevention and Treatment of Prolonged Pain Following Extraction and Oral Surgical Operations.

By BERTRAM B. MACHAT, D.D.S., Brooklyn, N. Y.

(Read before the Reading Dental Society, April 1, 1920.)

THE evolution of dentistry within the past several years has been marked by three great strides; namely, the simplification and utilization of the X-ray, the perfection of conduction anesthesia, and the recognition of the culpability of dental and oral lesions in the production of general disease. Coincident with these developments came the numerical increase in the extraction of teeth and operations upon jaws, with the usual ratio of post-operative complications, chief of which is prolonged severe pain.

Considering that the extraction of teeth is the most common and the most talked-of operation, it is noteworthy that post-operative pain, the most common aftermath, has received but scant attention in our literature. Therefore, the principal purpose of this paper is to stimulate dentists to the study of this subject (post-operative pain) to the end that prevention and elimination may be better understood.

Pain, that vexing problem of the exodontist and oral surgeon, may as an ultimate condition (at least so far as it concerns mouth surgery) be ascribed to pressure—pressure upon sensory nerve filaments which either locally or remotely gives rise to a distressing phenomenon that is commonly characterized as pain.

Irritation may be due to mechanical, chemical, physiologic, pathologic, and electric agencies. *The one constant factor is pressure.* To the dental surgeon this is of special interest, because of the

anatomy peculiar to his field; namely, the constancy of highly vascular and exquisitely sensitized soft tissues in immediate contact with hard unyielding structures. Thus, the smallest particle of hard, foreign substance, when compressed against the normal pulp will produce pain. Congestion of this organ and the peridental tissue, in itself ascribable to many primary factors, spells severe pain. Electric pressure (voltage) in too great dosage will cause pain and shock. The most intense suffering incident to acute alveolar abscess may be instantly relieved by giving vent to pent up *detritus*. Dressings may act both as a cause of pain and a means of relief, depending upon their rôle as a drain or a block. The agonizing pain experienced in the passing of a renal stone is never forgotten. Hysteria pains are often dispelled by hemorrhage. In the last analysis it is pressure that we have to overcome. Again the duration and intensity of pain may be due not only to local agents, but also to predisposing factors, such as the state of health, environment, nervous and psychic individuality of the patient.

Clearly, an exhaustive consideration of all causative factors of after-pain is practically impossible within the scope of one paper. It is intended this evening to present the writer's experience and observations upon this problem as noted in his every-day practice and to venture certain conclusions. Conforming with the foregoing—the study of the causes



and management of after-pain—this subject may be divided into pre-operative, operative and post-operative pain.

#### PRE-OPERATIVE PAIN.

Of foremost importance in the prevention of post-operative complications, is the operator's ability to localize and recognize the true etiology of the complaint. The writer has given much thought and expression relative to the value of diagnosis in the field of the general practitioner. To the exodontist and oral surgeon *diagnosis should be fundamental*. Pain has always been the most convincing argument for the extraction of a tooth, yet regardless of the intelligence of the patient, the location of the pain is not always a safe guide to the underlying cause, for unless relief is effected, even in the face of a successful operation, the surgeon is apt to be stigmatized.

We must remember that aside from pain, which in the mouth is frequently of referred nature, co-existing mixed trouble is not uncommon. For example, we may have simple pulpitis in one tooth and pericementitis in an adjoining or distant tooth, yet the removal of the former obviously will fail to relieve the pain in the latter tooth. As a result the patient is likely to say that the wrong tooth has been extracted. Again, the removal of a tight packing from a tooth socket may fail of relief, because of another tooth in a state of trauma. Similarly, the proper reduction and apposition of a fractured jaw may fail to comfort the patient, whose severe pain, after all, will be located in an acute adenitis, a temporo-maxillary articular involvement or an acute osteitis, quite removed from the seat of trauma. Aside from errors in diagnosis misleading the operator, failure to recognize the correct etiology of a pre-operative complaint may prompt the dismissal of a case, which, in fact, demands immediate action. In further support of our contention that upon correct pre-operative diagnosis depends post-operative success, and that, conversely, snap diagnosis may be responsible for post-operative pain, let me cite some practical cases.

No matter how trivial the operation may seem, it is our practice to carefully note the history of the case and then endeavor to qualify the complaint by exhaustive analytical tests. Where general inspection and objective percussion, transillumination, thermic, electric, and radiographic survey have failed to localize the seat of the trouble, zone blocking is resorted to. Especially is this latter method valuable in cases of mixed dental lesions with a complaint of referred neuralgia. However, failure of objective verification places the case upon an expectant plan of action subject to further developments and final diagnosis.

With all the data at hand one should, at this point, be able to estimate the general psychic and local conditions pertaining to the case, correctly forecast the steps to be followed and squarely present the facts to the patient. Especially will this attitude be found advantageous when treating a physician, surgeon or dentist.

With the hysterical and unreasonable individual, one must be extremely alert lest blame for unavoidable complications be placed upon the operator.

While a word of encouragement at the psychological moment will greatly comfort and relax the patient, it is a grievous error to promise anything that cannot be fulfilled. To my mind the dental surgeon, who is endowed with a knowledge of psychology in addition to operative judgment and skill, is best equipped for the management of nervous cases.

As a rule, the asthenic or depressed patient will give us very little trouble because of his unsusceptibility to nerve stimuli and a stoicism gained through long invalidism; he is perfectly tranquil and co-operates under all conditions. On the other hand, the hypertonic individual will show that condition by the tolerance of electric dosage during pulp testing (see DENTAL COSMOS, February 1919). Such a patient exaggerates the simple procedure of holding a film in the mouth into an exasperating ordeal. Her anxiety will run up her blood pressure and mislead the operator. She is all pent up, has a tendency to close her mouth, wrig-

gles out of position, interferes and interrupts. She is a potential nervous volcano and upon the first touch of an instrument is apt to give vent to a shriek that would madden a saint. Yet, let me assure you that such a patient, even like the hypertonic individual, can be controlled perfectly. It is a matter of judgment and poise on the part of the operator.

Excepting in the cases of hypertension, both vascular and thyroid, sedatives are seldom required. Blood examination, particularly the use of the sphygmomanometer, is an indispensable safeguard in my practice. Extremes of blood pressure and a poor blood picture will prompt special precautionary measures and in rare cases may contra-indicate the contemplated operation. Patients suffering from pernicious anemia, hyperthyroidism and advanced pulmonary, cardiac and renal conditions are poor subjects at best and no operation should be undertaken without the physician's co-operation. Acute infectious constitutional disease and wide spreading local pathology contra-indicate mouth surgery.

Primarily no one factor stands out more potently in the causation of prolonged post-operative pain, than pre-operative protracted, acute, diffuse inflammation of the peridental tissues. Usually this condition may be satisfactorily treated by palliative rather than extensive surgical interference. In exceptional cases, scarification and the removal of the offending tooth under general anesthesia is indicated. But while relief may be effected, it should be borne in mind that the deep alveolar infection which is commonly the cause of such onset has not thus been eliminated. Indeed, the chief object with which the modern exodontist is concerned is the eradication of the focal infection, and it is well recognized that where bone involvement has occurred as a result of dental infection the mere removal of the offending tooth without the careful curetment of the necrotic tissue will fail of its purpose. Hence, the reduction of the inflammation to a quiescent state is de-

sirable before a secondary operation for the excision of all diseased tissue is undertaken.

Again, where a quiescent condition obtains, general anesthesia has not been found advantageous. For not only is access to remote parts of the mouth difficult by the constant interference of the tongue, cheeks and secretions, but the recumbent position of the patient, the nasal or mouth inhaler and the evanescence of the anesthesia unavoidably hasten the operation.

#### CONDUCTION ANESTHESIA.

Obviously, where a clean, clear and prolonged anesthetic field is desired, plus co-operation of the patient, circumscribed and regional or conduction anesthesia should be the method of choice, notably in cases of root resection, excementosed roots, impacted and unerupted teeth, comminuted fractures of jaws and in general where a bloodless field is necessary. Conduction anesthesia is particularly favorable since it can be accomplished without pain, produces profound anesthesia, covers a wide area, and lasts, according to the zone, from one-half to three hours.

A striking example of the advantage of conduction anesthesia in dental surgery is the post-operative success that attends the operation of certain selected cases of circumscribed acute inflammation. We have in mind cases in practice, of acute periodontitis of single and multi-rooted teeth that have been opened throughout the canal, then curetted, enlarged and filled and the apical end resected, all in one operation and under one anesthesia. The main point is, there was no post-operative pain.

Novol (novocain adrenalin) or procain (novocain suprarenin), the anesthetic agent employed by the writer in hospital and private practice, has been found both safe and sane. The distressing symptoms which sometimes follow soon after the injection are due to: (a) Faulty anesthetic and (b) faulty injection.



*Faulty Anesthetic.* (1) Failure to employ a sterile isotonic medium or vehicle may produce various untoward symptoms.

(2) The epinephrin ingredient is responsible for the tachycardia and other disquieting symptoms. However, this ingredient varies in the different tablets which are now marketed by several manufacturers and a careful selection will obviate much of the trouble. Some operators prefer to add adrenalin to the novocain solution, thereby gaging the quantity according to indications. The pre-operative administration of bromural ten grs. the night before and one hour preceding the operation upon hypertension cases will prevent most of this trouble.

(3) The temperature of the anesthetic should approximate body heat.

*Faulty Injection.* (1) Too rapid injection is bad technique and bad judgment in infiltration anesthesia. I recommend two mils of a two per cent. solution for each dose. The injection should be very slow—from two to three minutes.

(2) Injection into a bloodvessel is apt to be followed by immediate collapse, thus greatly disconcerting the operator. However, it is of short duration (the patient quickly returning to normal, and not infrequently apologizing for her nervousness) and with the exception of a slight soreness at the point of the puncture and lack of anesthesia of the part to be operated upon, nothing untoward is noted.

(3) Injection of excess anesthetic in fibrous and muscular tissues will produce vasomotor disturbance and aside from failure of anesthesia of the part intended for operation, may cause loss of function, sloughing, protracted pain, etc.

(4) Direct injection into a nerve trunk will produce instantaneous anesthesia. However, where a considerable quantity of the drug has thus been injected severe complications may follow, notably: neuritis, protracted anesthesia of the part supplied by that nerve, etc.

The exact location for infiltration should be a matter of acquired technique. A good indication to follow is the ease with which the solution is emptied into the part, which shows that the anesthetic is being deposited in loose, cellular, nerve-bearing tissue.

Large cumbersome syringes, designed chiefly to overcome back pressure, are unsuitable for conduction anesthesia. I prefer a delicate, finely ground and accurately fitted instrument.

Testing for anesthesia should be objective rather than subjective, and in this respect the patient cannot always be relied upon. Manifestly, where mandibular anesthesia has reached the incisor region, it is sufficiently profound in the posterior part of the mandible and only occasionally will such a case require long buccal injection for the completion of anesthesia. So with other zones where pinching with an instrument over the well-known landmarks elicits no reflex (no expression from the patient), anesthesia of the part has been reached. One must be certain of that, however, for the first introduction of a surgical instrument is an important psychological moment and unless the anesthesia is profound, the patient will think the operator cruel and lose confidence. Again, where anesthesia is complete, the operator should be master of the situation. His attitude should express patience, perseverance, gentleness yet firmness.

Before leaving this part of the subject, let me emphasize that every step pertaining to anesthesia presupposes absolute asepsis.

#### OPERATIVE PAIN.

As simple an operation as the extraction of a tooth may seem, its variability is perplexing to the unwary. Even under ideal conditions we have known the removal of a first or third mandibular molar to have taken from a few seconds to several hours for its accomplishment. Therefore, a forecast of the contemplated operation should be prompted by absolute candor. Rather should we overestimate than minimize the extent of the work or its probable reaction. If properly explained, the patient will always assume his part of the burden.

A differential radiographic survey will point out the landmarks and facilitate the selection of suitable instruments.

While absolute surgical asepsis in mouth operations is not always possible, every effort to that end should be the watchword. Packing of the back of the mouth and the exits of salivary ducts will greatly help matters. The operative field must be well illuminated and



kept free from impedimenta of any kind.

The area to be operated on should be carefully sponged, dried and painted with aconite and iodine. At this point it should be remembered that reaction incident to repair of severed tissue will depend upon the extent of the injury and operation, hence every step will have to be designed with a view to minimizing surgical trauma. The tissues overlying the alveolar plates should be retracted before attempting to dislodge the tooth. The beaks of the forceps should be placed parallel with the long axis of the tooth as far subgingivally as is consistent with the condition at hand. Evulsion, it should be remembered, is more a matter of skill than strength. Upon delivery of the tooth, make careful inspection of the part, including the tooth socket to its extremity, the alveolar margins and the adjacent teeth. Examination of the extracted member will show whether or not it has been removed *en masse*. Careful search should be made for the missing parts and, if still retained in the socket, these should be removed.

This frequently will require a flap operation which, in fact, is as often the best expedient.

Careful curettage of infected tissue is imperative. This, however, should be done with intelligence and caution. Unwarranted scraping and mutilating will produce irreparable damage, especially where the dental canal and antrum have thus been invaded. In cases of large granulomata or cysts, we prefer a trans-alveolar operation for the direct excision of the pathological tissue. The tooth is then removed, the flap is sutured, a small dressing is placed in the mouth of the socket, the patient is advised concerning the care of the wound and dismissed. It is then followed up for several days successively, and on the fourth or fifth day the sutures are removed and the patient discharged. In root resections the technique is similar, differing only in the extent to which the bur or chisel is employed. Tissue retractors are used mainly for posterior work. In the anterior part of the mouth we prefer to

suture the turned flap and keep the field clear by means of lip or cheek retractors. In so doing much of the trauma is eliminated, and seldom are these operations followed by complications of any kind. In all extractions, bony margins should be trimmed smooth and even with the alveolus of adjacent areas. This is especially to be recommended in cases of sixth-year molars or cuspid teeth.

In the hands of a skilful dental surgeon an elevator is a boon. In fact, its usefulness in exodontia often surpasses forceps. But unless deftness and skill accompany the wielding of an elevator, complications (chiefly after-pain) are commonly the result. Application of the elevator presupposes the protection against undue trauma of the part which serves as a fulcrum. For example, in the removal of a third molar we have an ideal opportunity for the employment of an elevator. However, where the second molar is unsupported by anterior teeth it is not unlikely that it may be dislocated, thereby causing extra dental trauma and severance of the nerves. Similarly, when the alveolar wall is made to serve the part of a fulcrum, fracture of this or of the bone is not improbable.

By far the most obstinate problem in exodontia is the mandibular first molar in an unbroken arch. When this is complicated by chronic infected, frequently hypercementous roots and massive overlying bucco-lingual plates, an attempt at its removal *en masse* is as unsurgical as it is unmechanical. Indeed the failure of the general practitioner to realize this fact has been responsible for a large proportion of post-operative trouble.

In these cases we prepare for an operation, not an extraction. With sharp excising forceps the crown is cracked off as far down as feasible. A suitable sized fissure bur in the right-angle handpiece is then used to separate the roots and remove the septum. A preferable method is to do a buccal flap operation. A semi-lunar section of the alveolar process is chiseled away far enough to permit the introduction of an elevator between the roots. A slight turn with a flat-bladed

instrument will split the roots and each one, separately, may then be lifted out. In certain cases, the tooth may thus be lifted out *en masse*, utilizing the remaining part of the septum as a fulcrum. With this technique, we not only obviate the fracture of the roots or alveolar process as would be the case in vertical wedging, but we safeguard the adjacent teeth against trauma. In this connection it has been found that even mild pressure against the roots of the normal teeth will produce post-operative pericementitis.

Following inspection, and smoothing and trimming of alveolar margins and curettage if needed, the socket is irrigated, dried, and iodized. A blood clot is then agitated and the wound is covered by a slight dressing and the flap sutured. Special care in the approximation of flaps in the region of muscular attachments is imperative. In these cases the patient is advised of the necessity of keeping the part undisturbed and the dressing immobile.

Dressings are used chiefly in the mandible and even here it is intended rather as a check against the entrance of extraneous matter than as a drain. Tight packing is employed in hemorrhage cases only. In all operations where dressings are used they are changed daily.

#### POST-OPERATIVE PAIN.

With regard to post-operative pain, it is significant that despite miscellaneous methods of operation, adverse conditions, and generally an unaseptic environment, the great majority of extractions are successful. However, since surgical exodontia is on the increase, pain is frequently a sequel. Certainly its alleviation should be a matter of vital concern to every one imbued with the proper spirit of his calling. Speaking of a successful operation in the face of unendurable pain is a felicitation shared by the surgeon alone; the patient is likely to give a "painful version" of that success. Having eliminated probable exaggeration, which is characteristic of certain individuals, we are confronted by bare

facts which demand our serious attention.

Careful check-up of the anesthesia and operative technique will solve many problems. In my practice I find, as each and every step is studied and perfected, a proportionate percentage of operative sequelæ is reduced. At present we estimate this percentage at three per cent., of which two per cent. complain of pain. Considering that we deal almost exclusively with surgical exodontia and general oral surgery, this percentage seems not out of proportion.

When searching for the cause of pain, we must be sure that we do not leave the most obvious for the last. The writer listened to a discussion upon hemicrania by several medical specialists, during which discussion the question of potentialities of teeth seemed to be a last consideration.

Post-operative pain may often be traced to simple mechanical trauma. Pain confined to the operative zone will frequently be traced to dressings that, although well designed, when left too long become a source of irritation, chiefly because they block drainage and interfere with union. Where co-existing conditions are ruled out the treatment is obvious.

Another simple condition, that we meet commonly as an aftermath of an otherwise satisfactory extraction, is the case of a cuspid or a molar area which apparently runs a normal course the first several days and on the fourth or fifth day the patient returns complaining of pain. Examination reveals a taut mucosa folded over an angular or irregular hard substratum, blanched in part and having an angry red appearance at the periphery. The slightest palpation elicits severe pain. Relief in this case may be obtained by retracting the flaps (under conduction anesthesia), trimming (with Ronguer forceps) the projecting or ragged alveolus and dressing lightly. Where the pain is due to the involution of the gum tissue over alveolar borders that are otherwise satisfactory, separating the bucco-lingual flaps by means of a superficial dressing so that contact with



the alveolar edge is obviated will tide the patient over.

Still another condition, even more trying, always accompanied by a history of local and referred pain, loss of sleep and general irritability, is traced to a traumatized tooth adjacent to the wound. The operative history will probably show the vigorous use of an elevator or dislocation accidental to extraction. Slightest percussion of the offending tooth will give both subjective and objective proof of its involvement. Electro-dental testing will help to determine the vitality and normality of the pulp. This may be verified by the thermic and ethyl chlorid tests. Radical treatment will be indicated if the pulp is found devitalized. Temporarily this condition can be relieved by opening into the tooth and removing the dead pulp. The reduction of the occlusion in any event and ligation of the tooth wherever possible, plus the use of the ice pack, will afford relief.

A not infrequent condition met with by the general practitioner is the protracted pain in edentulous jaws which is usually associated with remote neuralgias. Examination reveals a history of extraction probably months before, with pain, sleeplessness, and not infrequently emaciation dating back to the time of the operation. The clinical picture presents a partially healed, irregularly shaped alveolar crest containing numerous bumps and grooves, some of the latter probably hemorrhagic. Occluding the jaws will show that the opposing teeth are the offenders. In connection with these cases, it is a curious fact that the dentist commonly advises waiting for the "gums to heal" before he will be ready to insert artificial teeth. To the contrary, in cases where owing to extractions the gingiva has been rendered vulnerable to attack by any agency, especially the opposing teeth, immediate "shoeing" by means of base plates is recommended. Patients who can afford the added expense are advised to have a "temporary" set without delay. In the light of recent developments in plate technique, the dentist should have no difficulty in retaining the denture. We find that occasional

compensating for the atrophy of tissue by means of Kerr's compound is a simple procedure and the patient may be thus afforded great comfort; incidentally a more even healing is assured.

A most disquieting condition to both surgeon and patient is the protracted anesthesia mesial to the site of the operation—an evidence of sensory nerve injury. The patient may describe this condition as a burning, pinching, tingling and generally uncomfortable sensation. This is commonly seen in the mandible, although similar trouble has occurred in the zone covered by the infra-orbital injection. Stimulation of the part is essential. The violet ray, hot irrigation and massage are found helpful. In rare cases re-operation may be the only remedy.

Infected wounds will manifest that condition by the presence of pus or putrescent odor, or sloughed tissue, tenderness to palpation, glandular involvement, coated tongue, foul breath, headache, etc. Generally this condition is subacute. In the acute state, local pain may be severe; septic temperature and a leukocytosis is to be looked for. In the latter case free drainage, stimulating irrigations, the application of ice packs one-half hour alternately, hot foot-baths, purgatives, liquid diet and rest is to be advised. In the quiescent state, removal of the necrotic tissue, proper drainage and frequent warm stimulating irrigations are indicated.

Trismus, in addition to severe pain, is not uncommon as a sequel to extensive surgery attending the removal of first and third impacted molars, yet a reaction not abnormal to operations of this nature. Physiologic rest is an outstanding requirement in the treatment of these cases. The use of ice packs, liquid diet and the internal administration of

R—Acetanilidi,	grs. ij
Phenacetini,	grs. v
Caffeinæ citrat.,	gr. j
<i>D. t. d.</i>	

to be made up in powders or capsules and taken four or five hours apart until pain is relieved, have been found effective.



In every case where the operative data is not clear, it is advisable to radiograph the part, and if possible, in addition to an extra-oral plate, an intra-oral film should be taken. In refractive cases the presence of a retained root or granuloma should be looked for. Where the findings are positive, re-operation at the earliest moment is advisable. Until then, treatment as outlined for the expectant plan is to be followed.

The prolonged pain incident to dry socket will be found unresponsive to treatment until curettage is performed and a healthy blood clot is induced. Wounds in the location of muscular attachments are prone to delayed healing. So, too, with wounds of other parts in and about the mouth that are in a state of motion. The principle followed in the treatment of wounds in other parts of the body holds good in the mouth. Immobilization, stimulation and cleanliness are the important factors in tissue repair.

Since our understanding of infection and immunity is becoming clearer, we are able to account for the marked systemic reaction that often follows the surgical interference or removal of an infected tooth: a condition significant

of the lighting up of closed focal infection. This may occur not only in operations upon diseased teeth, but also in cases of extraction of numerous healthy teeth, but of a pyorrhetic environment. The absorption of toxins into the general system leads to toxemia. Where secondary foci are present these may become activated and a general violent reaction, characterized by all symptoms of an acute septic condition, may ensue. To the pathologist such a reaction is of value as a therapeutic test. Generally, there is a variable temperature, pain markedly all over the body, a pounding at the back of the head, lassitude, malaise, loss of appetite, etc., lasting from three to six days, after which the patient recovers rapidly.

In point of caution, it should be said that the lighting up of too many foci may also lead to the absorption of bacteria and consequent bacteriemia. Since dental foci of infection usually harbor streptococci, the danger of streptococcemia, a very grave condition, should always be a deterring factor in undertaking too extensive septic mouth operations.

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# The Prevention of Periodontoclasia (Pyorrhea Alveolaris).

By ARTHUR H. MERRITT, D.D.S., New York, N. Y.

(Read before the Alabama State Dental Society, at its annual meeting at Mobile, April 13, 14 and 15, 1920.)

PERIODONTOCLASIA is the name which has been given to that group of diseases which affect primarily the supporting tissues of the teeth, that is, the gingivæ, the alveolar process, the cementum and the pericementum, and which for many years has been called pyorrhea alveolaris. The latter term has never been satisfactory, inasmuch as it is inaccurate, and misleading as applied to all forms of the disease except to the suppurative and usually advanced stage. It has been this failure to discriminate between the different types of diseases in the dental investment, and the variety of forms in which they express themselves, that explains the confusion which has prevailed in the dental profession regarding these lesions, and also explains their neglect of them; for it has been said, and it is probably true, that more teeth are being lost today and more ill-health caused by so-called pyorrhea, than by all other mouth diseases combined. This is true, because the profession as a whole has not been alive to its responsibility in this important feature of dental practice. Diseases of the dental investment affect the very foundations of the dental arch. To construct beautiful restorations, as is being done everywhere, and place them in teeth, the supporting tissues of which are involved in disease, is like building a house on the sand. It is a failure to recognize the most fundamental principle in dental practice, *viz.*, that the supporting structures of the teeth must be maintained in health if the teeth are to be preserved, and that no art however perfect it may

be will avail anything where this is neglected.

## ETIOLOGY.

Periodontoclasia, and I shall use the term in its broadest sense, has a variety of causes, most of which are local. A study of these causes reveals the fact that they have one characteristic which is common to them all; namely, they are irritative in their nature. This irritation expresses itself in two ways: first, that which begins at and at first is confined to the gingivæ, and second, that which affects the entire periodontal tissues.

The more obvious of these, and also the more common, is that beginning at the gingivæ. The free gingivæ project themselves from one to three millimeters above the gums, closely hugging the cervical enamel and forming in this way the subgingival space, the floor of which is bounded by the gingival group of pericemental fibers, the alveolar process and the cementum. It is at this point that the first lesion in periodontoclasia occurs, at least the most obvious lesion. In the light of recent investigation, it is possible that some subtle changes in the pericementum and alveolar process may occur as a result of occlusal trauma and which antedate or may be coincident with those which take place in the gingivæ.

Anything which irritates the gingivæ is a potential cause of periodontoclasia. Uncleanliness of the mouth, food impaction as a result of defective contact points, overhanging edges of fillings, ill-

fitting crowns, bridges, etc., are all causes of gingival irritation. Of these, the most common and potentially the most dangerous is uncleanness of the mouth.

#### TRAUMATIC OCCLUSION.

The second form of irritation, that which affects the entire periodontal tissues, is traumatic occlusion. This may be defined as an incoördination between the inclined planes of the opposing teeth when brought into occlusion, as a result of which the teeth are driven outside their normal limits of motion and subjected to a lateral strain, which if long enough continued results in definite changes in the pericementum and alveolar process with a coincident loosening of the teeth. This may exist in teeth with normal occlusion, according to the Angle Classification, and is a very common cause of periodontoclasia; it and bad hygiene being the chief causes.

#### TREATMENT.

The treatment of periodontoclasia when well advanced requires a technique so exacting that only one who has been specially trained can hope to deal successfully with such cases. This treatment consists in the removal from the exposed cementum not only of all calculary deposits, but of the necrotic pericementum also, at the same time leaving the surface of the root smooth and free from grooves and pits. The occlusion must also be studied and when necessary corrected by judicious grinding of the occlusal planes. The strictest hygiene must be observed and maintained. When these conditions are met periodontoclasia, even in its suppurative and advanced stage, can be cured, by which is meant, the diseased tissues can be restored to health. This does not mean that all cases can be cured, for they cannot, since every case will reach an incurable stage if long enough neglected.

Prognosis will therefore depend upon the stage to which the disease has progressed when it presents itself for treatment. Nor will curable cases resume

their original condition even after the most successful treatment. In every instance, if at all advanced, the evidence of the disease, like an old scar, will remain. The permanently receded gums, the lost gingiva, the partially destroyed alveolar process, the loosened tooth, will still remain as tell-tale evidence of the devastating effects of periodontoclasia. But notwithstanding this fact, it is a curable disease, a statement which needs to be emphasized inasmuch as there are those who still assert that it is incurable.

While it is true that periodontoclasia if at all advanced can best be dealt with by the periodontist, its prevention lies in the hands of the general practitioner of dentistry. The needs of the public and the responsibilities of the dental profession can never be wholly met through the cure of this disease, however successfully this may be done. Not every one can command the services of the specialist, and even though they could do so, not a fraction of those in need of his services could receive treatment because of the vastness of their number and the relatively few specialists. Moreover, prevention far outweighs in value any treatment which may be given. Fortunately, periodontoclasia is a disease that can, in most instances, be prevented, providing only that intelligent care is observed.

It should be kept in mind that except for possible subtle changes which may occur in the pericementum and alveolar process, as a result of traumatic occlusion, periodontoclasia always begins at the gingival margin of the gum. *Pyorrhea alveolaris*, with its pus pocket and destroyed alveolar process, does not spring into existence over night; it is preceded by long years of less serious symptoms, which if recognized and corrected would never be succeeded by the more advanced stages of the disease. In the prevention of diseases of the periodontal tissues, the most important thing is the maintenance of the gingivæ in health. This requires that the mouth shall be kept clean, for the most common cause of gingival irritation and disease is uncleanness of the mouth. It is essential, therefore, that the general



practitioner of dentistry give the greatest care to the hygiene of his patient's mouth, if the prevention of pyorrhea alveolaris is ever to become an accomplished fact. This means more than a perfunctory polishing of the teeth. The gingivæ of the entire mouth should be carefully examined and the subgingival space explored. It is amazing the amount of foreign material which will collect in these spaces with little visible evidence of its presence except a slightly inflamed gingiva, which too often is overlooked by the dentist. Whenever there is gingival inflammation from any cause, the quantity of serum which pours normally into the subgingival space, is increased, and deposits may and usually do occur. These deposits are the result, and not the cause of gingival irritation, though they in their turn add to the already existing irritation and inflammation, and in this way establish a vicious circle.

#### PREVENTIVE TREATMENT.

Treatment for prevention can be successful only as it is undertaken seriously and systematically. It includes a careful routine examination of the gingivæ as a part of the routine examination of every mouth; the treatment necessary to remove all cause of irritation, careful training of the patient in intelligent care of the mouth and finally subsequent observation to insure against relapse. Treatment consists in thoroughly cleansing the subgingival space in its entirety about every tooth. This cannot be done by the ordinary scalers, as they are not adapted to the requirements of the case. Small curets made in rights and lefts I have found most satisfactory.

Having explored each subgingival space and carefully removed the contents, the teeth should be carefully bathed in a weak solution of iodine tincture and the teeth carefully polished, preferably with silex, until every surface is thoroughly cleansed. Brush wheels, rubber cups, wood points, waxed silk tape, etc., are the instruments to be used in this operation. The important thing is

that it be well done. How large a part traumatic occlusion plays in the initial stages of periodontoclasia, it would be difficult to say, but probably not so large as in those cases where the disease has progressed to the point where the teeth have been seriously weakened by the loss of a considerable part of their supporting tissues. Nevertheless, it is a factor to be considered, and in the prevention of pyorrhea every case should be examined to ascertain whether traumatic occlusion be present, in which event it must be corrected. This can be done by judicious grinding of the occlusal surfaces of teeth so affected. This should be done carefully so as not to mutilate them, yet sufficiently to relieve them of undue strain.

The mouth should next be examined for open or defective contact points, overhanging edges of fillings, ill-fitting crowns, bridges, etc., and where these are present steps should be taken to correct them, for they are among the causes of gingival irritation. In a word the mouth should be viewed in its entirety, and the patient be made to understand that the health of the mouth as a whole depends upon careful attention to all these details, and that you, as the family dentist, cannot be held responsible if they are unwilling to follow your advice. The proper time to do this is when the patient first presents for treatment. This general rule must be followed out systematically, if prevention, not only of periodontoclasia but of dental caries, is ever to be achieved. And there can be no doubt that in many cases a very large percentage of these diseases can in this way be prevented.

#### THE PATIENT'S PART IN MAINTAINING ORAL CLEANLINESS.

There still remains an important part in the scheme of prevention, and one which if neglected will in large measure bring to naught the most painstaking care on the part of the dentist, and that is the care given by the patient to his own mouth. This again must be given the same systematic care that is given to the treatment of the case by the dentist.

Before any instruction is given, careful inquiry should be made of the patient to ascertain his habits of mouth care. This should include inquiry regarding the form of toothbrush, kind of dentifrice, frequency and way in which they are used, etc. Having learned these facts, one is in a position to advise what changes are necessary, and there are few cases where a more or less complete change will not be found to be desirable.

The first requisite is a small toothbrush of good quality with each tuft of bristles separated, those at end of the brush being shortest. Dentifrices of known composition should be prescribed, not for their therapeutic value (for they probably have none) but because of their abrasive and cleansing effect. Wax silk tape of sufficient width to meet required needs should also be provided.

#### METHOD OF BRUSHING THE TEETH.

Having provided the patients with the necessary instruments for the proper care of their mouths the next and most important step is to instruct them in their use. Unfortunately there is a diversity of opinion regarding the best method of tooth brushing, which it is well nigh impossible to reconcile. There is, however, quite general agreement on one point, *viz.*, that horizontal or cross brushing has no place in the care of the mouth. That leaves but one other way in which teeth can be brushed and that is vertically, or by a combination of vertical and horizontal strokes as in the so-called rotary method. Among those

who indorse the vertical stroke there are those who believe that the brush should be carried from the gums toward the teeth, others who assert that the movement should be from the teeth toward or onto the gums, and others again who recommend a straight up-and-down motion or a combination of the other two methods. It is probable that any one of these three methods can be safely and efficiently employed providing only that it is intelligently done.

The principles underlying tooth brushing may be described as first, simplicity; any method employed should be so simple that anyone can easily learn it, even those most lacking in manual dexterity. Secondly, it should be efficient; the teeth and mouth must be thoroughly cleansed. Thirdly, it must at the same time provide a reasonable amount of stimulation to the supporting tissues of the teeth. Fourthly, it must do all these things without injury to either the teeth or the gums. Any method which will comply with all these conditions may be safely employed. The instruction of the patient in every detail of personal care, is important. It is usually desirable to demonstrate in one's own mouth the proper use of the toothbrush, explaining meanwhile the purpose of tooth brushing, why teeth decay, and why the gums and alveolar process become involved in disease. It is only as this is done, and the patients thoroughly interested, that one can hope to secure their co-operation, which co-operation is essential if a full measure of success is to be achieved.

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## Diseases of the Teeth Are Preventable: Dentists Not Responsible for Cause Nor the Prevention.

By A. E. WEBSTER, M.D., D.D.S., Toronto, Canada.

(Read before the District of Columbia Dental Society, Washington, D. C., April 1, 1920.)

IT has often been stated that less than twenty per cent. of the people of this continent get any kind of adequate dental attention. If this be true, and there is little reason to doubt it, there will surely be a day of reckoning. Through the legislatures the people have made prohibitory dental laws and in a sense dentistry has taken the responsibility of supplying dental services to all. If this service is supplied to only the well-to-do and eighty per cent. of the people must go without any, let us not complain if the man in the street dislikes governments and places dentists among the privileged classes. Sooner or later all the people will receive dental services, whether by private dentists or by those employed by the State hygienists or dental quacks. All the people must get equally of the essential things of life or democracy is a mockery.

That we may better understand the present and see more clearly what the future has in store, let us study the past. In Europe, as a general thing, dentistry is practiced as a specialty of medicine. There is no law on the statute books prohibiting any person from practicing any of the professions, so long as they who practice do not hold themselves out as being qualified by law and entitled to call themselves physicians, lawyers, or dentists. From this one would think that the dentist was in the same relative position as the physician, but under the public health act in most countries no one but a qualified physician can administer an anesthetic, report contagious

diseases, give death certificates, or hold public positions under the act, while there is nothing the unqualified dentist may not do, except call himself a dentist, or the qualified can do that nobody else can do.

When the dental act of Great Britain was passed in 1878, every one who had anything to do with dentistry was given a license. It was expected the people would be properly served, which was perhaps true for a few years. Ever since then there has been a gradual increasing demand for dental services and even a decrease in the number of dentists. The qualifications were so high, the cost of an education so great, the rewards so small and the unqualified so successful, that there were few young men to enter the profession. The public would have service, hence the wonderful increase of the unqualified dentists in England. There is said to be two or three times as many unqualified as qualified. The conditions in Great Britain are typical of other countries in Europe.

On this continent dentistry separated from medicine and obtained its own legislative authority and established its own relations to the State. As in Europe, there has been a marked increase in the demand for dental services. There are enough qualified dentists to serve perhaps, twenty per cent. of the people. The balance are demanding it. What is to be done? The situation will be met as in Europe unless the profession itself does something. The public is long-suffering. It will tolerate a grievance for



a long time, and then rise up and destroy many good things before justice is reached. It is a wise counsellor who sees an injustice and corrects it before justice is forced by the populace.

#### MEANS BY WHICH A GREATER NUMBER COULD RECEIVE DENTAL SERVICES.

There are many ways by which a greater number of people could receive dental attention.

1. Increase the number of dentists. In the minds of even some noted dentists and legislators this is the only solution.

2. Increase the productiveness of dentists by better equipment, trained assistants, nurses, hygienists and prosthodontists.

3. Make a more equal distribution of the dentists now licensed.

4. Reduce the cost in both money and time.

5. Supply a less troublesome and painful variety of dentistry to the people.

6. Disseminate a knowledge of the value of dentistry throughout the land.

7. Change the whole method of practice and treatment and thereby decrease the need.

It is quite clear that if all the people wanted dental service of the kind that is now being practiced, there would need to be a great many more dentists. If dentistry is going to build large contour fillings, devitalize dental pulps, remove them and fill canals, as well as treat infected and diseased teeth, and make splints, crowns, bridges and clasp dentures, and correct irregularities, it is hopeless. Such operations demand the highest skill, medical, surgical, engineering, artistic and mechanical. Very few people can afford the time or money for such service and the State would need billions to supply a national dental service of the kind now practiced and advocated by the leaders in dentistry. The situation, educationally and legislatively, would seem as if dentists were being educated so that they could make a living out of the people who have money, per-

mitting the balance to go hang. The "Lord helps those who help themselves."

Another way to meet the situation would be to increase the productiveness of the present members of the profession. A few have already caught the idea, but the majority go on in the same old way, proudly doing all their own work from charwoman to polishing dentures. The advertising dentist has learned efficient factory methods to his own personal gain, but not always to the advantage of his clientèle. There is no reason why an efficient well-educated dentist should spend his time making appointments, keeping books, sterilizing instruments, soldering crowns, or pumping a foot engine. These and other things can be done better by less expensive labor. A real dentist should be thinking of the etiology, symptoms and diagnosis of his patients' troubles, leaving to others that which takes less training and skill.

#### INCREASING PRODUCTIVENESS.

There are many factors which enter into the productiveness of a dentist, some personal and others business. Efficiency or factory methods, if you please, must be employed. The arrangement and general equipment of the office help wonderfully. Assistants or clerks, as well as trained dental nurses, have in many offices increased the output fifty per cent. The hygienist is the result of a demand and whenever directed by a competent dentist, who allows her to do only that which she has skill in, will increase the number of people cared for. The dental mechanic is in the same class and should be trained in the same manner as the hygienist and dental nurse.

The more people a given dentist can serve by gathering around him others of less expensive training, the fewer dentists will be required and the less the cost should be to the individual. Unfortunately, or fortunately, according to the viewpoint, the latter does not always occur.

The unequal distribution of dentists throughout the country is a cause of a lack of efficiency. There are towns of

less than fifteen hundred people with three and four dentists, while there are others of the same population without one. Dental societies, State boards, or the State itself, might well exercise some jurisdiction in this matter.

#### DENTISTRY TOO EXPENSIVE FOR THE MASSES.

The cost of dentistry is a reason for not having it done. If there were enough dentists to do all that is required at the present time, the half of the people could not afford it nor could the State afford to pay for it according to our present methods. The practice of dentistry has been a personal and private relation between the dentist and his patient and on this account expensive. If organized as before indicated, the cost is reduced. Following his experience in the Army, an English army officer of renown said he could fill all the teeth of the poor of England, which did not need devitalization, from the profits made out of making vulcanite dentures for the edentulous at a guinea a piece. Instead of dentistry becoming cheaper, it is becoming more expensive and the more expensive it becomes, the fewer can have it. A dental education now takes four of the best years of a young man's life and at least as many thousands of dollars. In 1921 it will take five years and in 1926, six years. If such graduates do not serve more people than the present ones, the cost will be increased by one-third and the final result will be fewer dentists, unless the New Zealand plan is followed where the State is lending money to indigent young men of ability and allowing them to repay it in service in sparsely settled districts, or State institutions for the poor. In some practices there is a total disregard of the patient's time, who often spends an hour or perhaps two hours to get fifteen minutes of a dentist's time when there are hours of work to be done for him.

If dentistry must wait until the teeth are all defectively and irregularly erupted, decayed and diseased before her services are employed, as is the case to-

day, its practice cannot be otherwise than troublesome, disturbing, painful, and expensive. These factors are reasons for neglect among thousands of people who know better, but procrastinate in the hope that they may never need it. Our present methods demand discomfort, pain, money, and time—often far beyond the value of the service. Many people choose to go toothless in preference to visiting a dentist.

If everybody knew the value of dentistry, there would be a more insistent demand for it. The more widely it is known, the greater the number would demand it. Very few people have any idea *what* a dentist can do, outside of extract teeth and make dentures. It is true some have heard of crowns and bridges, but few know how to judge of the kind of services they are getting. They know "it hurts a lot and costs a lot."

#### NECESSITY OF PUBLIC DENTAL EDUCATION.

Every dental society and every dental organization since its inception has recognized the need of public dental education and has appointed committee after committee these fifty years to prepare articles for the press and for general distribution, with the result that now and then something is done, but without any continuous or persistent policy being followed. Sporadic advertising is useless and so is sporadic dental education of the public. The private dentist who has all he can do, sees no reason why he should spend his time and money in public education.

If less talk had been indulged in and more action taken among our general education authorities, results would have been better. Dentists do not know how to write articles on dentistry for the public to read, nor have they any right to pay anybody else. It is a question of public health and public education.

The advertising dentists of this continent met and called themselves the modern dentists, because by them alone the public is educated. It is through their advertisements, pamphlets and



private letters that a large part of the public gets any knowledge they have of dentistry. The newspapers are paid large sums of money for dental advertising, and are therefore not likely to print anything which will interfere with their business. The advertising of such dentists is continuous, attractive and follows a definite policy and is therefore successful. Such propaganda should be done by a propagandist employed by the State, as in tuberculosis and venereal disease.

Having discussed at some length the position of dental practice as it is today with suggestions for improving its scope and usefulness and indicating its hopelessness if the present methods of practice are to be followed, let us now consider if there is not a ray of hope along another line. We have made false pulps for teeth, ferrules for crowns and filth collectors for missing teeth, planted roots of teeth in the jaws, as well as bird cages, and attached whole dentures to single teeth with as little appreciation of the physiology, hygiene and engineering involved as might be exhibited by an untrained Indian.

A great deal of dentistry practiced would be better left undone, and not a few people have reached early graves because of over-enthusiasm in mechanical procedures. The great majority of dental researches have tended to destroy faith in our methods of practice and few have led us to prevent disease. Our postgraduate courses are all on treatment, little on prevention. Dental practice is empirical and mechanical. Though the theory of dental caries is known, there is no considerable dental practice based on it. Very few dentists attempt to prevent decay in any different way from that practiced in the days of Miller's youth. The discovery of the dental plaque by Williams and Black has had little effect on practice. The work of Pickerill, Sim Wallace, Colyer and Bellanby is unknown to dentistry, not to mention influencing its practice.

Dental researches have discovered a great variety of methods of restoring lost parts of the human denture and but few

successful methods of preventing the parts from being lost. Most of the researches of the past few years have been on drugs, root-canal treatment, and partial dentures—all unnecessary.

The writer knows full well that he lays himself open to criticism when he makes such statements as the foregoing before such a body as this, but it must be kept in mind that the members of the profession who attend meetings of this kind and read dental literature are in the minority. It is not intended to be like the scoldings the preachers give those present, which are intended for the absent.

As a general statement only those have public influence in any department of knowledge whom the public accept as authorities. Neither the court nor the public accept Henry Ford as an authority on world or national politics, but they do accept him as an authority on motor cars.

If the public believe dentistry consists in extracting teeth and making dentures, then dentists are accepted as authorities in these subjects, but as soon as they begin to express opinions on diet, rheumatism and anemia, they make themselves ridiculous in the eyes of the public. The physician is supposed to know all about diet, rheumatism and anemia, and his opinion will be taken in preference to the dentist's, no matter how much he knows. This is just what happened in the matter of focal infection. Dentists knew for years before Hunter's supposed revelations that diseases of the teeth were intimately associated with general diseases. Hunter's conversion was not without much contentious work and demonstration by his dental friends. But once persuaded, he told his medical friends. They believed in him and the fact was accepted. For many years British physicians and dentists were studying and co-operating in the treatment of rheumatism, anemia and heart lesions before it spread to America, though American dentists knew all about it. They were powerless to persuade either the physician or the public.

William Hunter brought the message



to America through an address before the medical students of McGill University, Montreal. His remarks commanded the attention of the medical profession and through it the public and the balance of the dental profession. Today the study and discoveries relating to teeth and health in America have far surpassed anything done in Europe.

#### DIET AND THE TEETH.

The studious and observing dentists of today are as firmly convinced that there is some relation between diet and defective teeth, diet and decay, mastication and dental caries, oral hygiene and general diseases, as they were twenty years ago on the matter of focal infection, but are unable to get the attention of the public.

It is almost twenty years since Sim Wallace directed the attention of the profession to the relation between sugars and starches and decay of the teeth. It is fully fifteen years since he proved this relationship on a squad of pupils in a boys' school. It is more than ten years since Pickerill discovered that the character of the enamel of the highly civilized peoples is more likely to be defective than the uncivilized. It is many years since it was known that faulty diet caused rickets.

It has long been known that privations in certain articles of diet caused certain diseases. In a recent article by Mrs. Bellanby on the dietetic influence on the development of the teeth and jaws, it is shown that defects of the structure and arrangement of the teeth are as much under the control of the dietitian as bodily growth itself. Teeth can be developed defective, or sound, regular, or irregular at the will of the dietitian. More than this, teeth though sound can be decayed or though defective can be prevented from decay at the will of the dietitian and the dentist. Oral hygiene, as the dentist understands it, reduces the incidence of percentage of the acute infectious diseases and many of the chronic. Oral prophylaxis does more than help to prevent decay of the teeth

and diseases of the peridental membrane—it prevents general diseases. It often takes the place of hard diet and proper mastication.

Mrs. Bellanby, in closing her remarks on diet and dentition said, "I have endeavored to supply you with evidence that the origin of many of our dental defects is possibly largely dietetic and that the factor at fault is very definite in its action. A writer in the *Lancet* says, 'Experience has taught me that there is no royal road to the prevention of dental caries. To believe that our nation will alter its diet to save its teeth is chimerical'. This is a sad forecast and I hope an untrue one."

"If my work and its application to human beings is correct, one important cause of unsound teeth and poor growth of the jaws is very well defined and the remedy obvious. With definite knowledge, definite instructions can be given and acted upon." The result of acting upon such instruction is that the diet will remain a normal one, and the time when this feeding is important from the point of view under discussion is the period of parental responsibility.

If these things are known, and a large number of the dental profession are persuaded of it, why do dentists as a body direct their whole attention to reparative processes and so little to the methods of prevention indicated above? In extenuation, one might say the whole principle or foundation of the healing art is based upon the cure of disease, not its prevention. Prevention is rather a modern idea. Besides this, the people with diseased teeth are suffering and must be attended to.

As previously exemplified, it is impossible for the dental profession to reach the public on matters of diet hygiene and public health. It can only be done through the proper channels. Dentistry only makes itself ridiculous when it goes before the people as an authority on the diet of pregnant women and infant feeding. Physiologists, physiological chemists, dietitians must first be shown the value of our contentions, and soon the whole body of the medical

profession will be in full consent, then State action will follow.

Sim Wallace, in a recent book, gives color to the foregoing by directing attention to the fact that little is known about the physiology of mastication, insalivation, and deglutition. The writer asked a noted physiologist and an author of a textbook for dental students how much time he gave to the subject of the physiology of the mouth in his course to medical and science students, and he replied "about eight minutes." Mrs. Ballanby, a physiologist, in reply to Sim Wallace, said, "The fact is that physiologists when they have thought about the matters at all have generally assumed that dentists knew everything there is to be known about the teeth, and when touching this subject they have been the gramophones of the dental profession."

#### SUGARS AND STARCHES AS CAUSES OF DENTAL CARIES.

A great number of practicing dentists are convinced that sugars and starches are in some way associated with dental caries. National dental decay is in proportion to the quantity of sugar consumed. Notwithstanding the teachings and practice of dentistry (which one must admit is without breadth) decay of the teeth is on the increase in civilized countries. The public has accepted prophylaxis, dental fillings, the toothbrush, toothpastes and toothpowder as the dentist's prescription for the prevention of dental caries. Everybody knows it is a failure. Such methods are of great value, but are doomed to failure because they do not, nor cannot, reach all the people, and are impotent to offset the influence of defects, faulty diet, and methods of mastication established before the dentist is consulted. So long as the national diet is sugar, corn and wheat starches, rice, chocolate and meat

extracts, vegetable oils, ice cream and candy, there will be national dental caries. This will continue to be the diet while the cook books, the daily recipes, the dietaries, the menus of domestic science schools, hospitals, schools, hotels, dietitians and physicians prescribe such food as a part of every dish. So far as national health is concerned, the "tuck" shop, the candy store, the ice-cream parlor and the afternoon tea are in the same class as the brewery, the liquor store and the saloon. The greatest service dentistry could do the nation is to get the ear of a noted physiologist, dietitian or physician.

The factors of personal and public health are diet to prevent defects of the teeth and jaws, diet, prophylaxis and dental fillings to prevent decay and diseases of the periodontal membrane. Pulp treatment and root-canal filling may be classed as preventive measures, but crowns, bridges and dentures are strictly restorations.

If the teeth of the nation are to be saved from decay and many of the ailments prevented which result from diseases of the teeth, there must be a popularization of the knowledge of the effects of diet on the structure of the teeth in their development and causes of decay. This can only be done through the proper authorities in physiology, physiological chemistry, pathology and general medicine. When it comes to the part played by prophylaxists and repair dentists, they are qualified to educate the public. Dentists must improve their methods of organization for both private and public service so that more people may be reached.

The teachings of proper diet reach all classes and are nation-wide in their scope, while the teachings of prophylaxis and repair are limited to the well-to-do.

## Efficiency in Dental Nursing.\*

By Mrs. CHRISTINE H. SCHUMACHER, New York, N. Y.

(Read before the Postgraduate Clinic of the District of Columbia Dental Society, Washington, D. C., March 31, 1920.)

FROM my experience as nurse and assistant to a dentist, I will enumerate the routine of duties absolutely necessary for cleanliness and efficient results in an up-to-the-minute dental office. By this means the assistant becomes an extra pair of hands to aid the operator, and a valuable asset and necessity to her employer.

### CARE OF INSTRUMENTS AND APPLIANCES.

As the average dentist's hours are from 9 A.M. to 5 P.M., it is essential for the nurse to be on duty at 8.30 A.M., in order to see that sterilizers are ready for use, electricity turned on at the switchboard, spray bottles filled, alcohol lamps refilled, all water connections turned on, wax heater ready for use, and cabinets filled with linen for the day's work, so that replenishing of supplies during the day will not be necessary.

Dust is matter out of place; examine the office and see that none has been overlooked by the janitor or maid. Be sure to oil electric motors and engine parts; wipe all parts free from excess oil; do not forget the oiling of the compressed air pump, for it is important to keep the machinery in good condition.

If all machinery be examined thoroughly by an expert every three months, and a close inspection made during the summer season, then kept in good condition by careful daily attention of the assistant, the operator will not be handi-

capped by breakdowns at most inopportune times. Smooth-running engines and true handpieces are an aid to good dentistry.

X-ray machines require special attention monthly by an expert to obviate serious trouble.

In developing radiographs, perfect your technique in detail; if necessary, consult experts to prevent spoiling properly exposed pictures. Keep the radiograph file in an orderly manner.

All scissors and shears must be kept sharp, to have good cutting edges.

Dental chairs should be thoroughly overhauled by the manufacturers and recaned. The foot controller, switches and motors should be examined by a mechanic from the dental supply company at least once a year. All handpieces examined by experts and repaired, to be in proper working order.

Have the dentist purchase a good, strong magnifying glass, high magnification, and have him use it to examine the burs that have been used for only one operation—and he will think twice before he will use them again.

Classification of instruments in small units for special classes of operations will be of great assistance to the operator.

### THE DAILY ROUTINE.

Sort the morning mail, leaving only the personal letters for the doctor's attention. All others the assistant can

\* A systematic course of duties for the dental nurse, suggested by and carried out in the office of Dr. Wilber M. Dailey, New York City.



answer, as she is familiar with the details.

Watch the thermometer, and keep a circulation of fresh air in the rooms.

After the patient arrives, and has removed her wraps, place her in the dental chair, adjusting the chair to a comfortable position. Protect the patient's clothing with a linen towel, fastened with a metal chain fastener. Then from the glass cabinet, place a sterile water glass in the glass holder while the patient is in the chair, add a mouthwash to suit patient's mouth conditions, and have a supply of hot water at hand.

If you are familiar with the prospective operation to be performed, before each sitting prepare the necessary implements by sterilizing before placing them in small sterile trays on the table tray. If the preparation is for surgical work, or root-canal work, special sterilizing will be necessary during operation.

At the end of the appointment, when the operating room is to be prepared for the next patient, remove the linen head-rest cover, and replace with a clean one. Wash the bracket table with a ten per cent. solution of alcohol before replacing the sterile enamel tray on the bracket table, and place a glass tray on the cabinet for soiled instruments used during the operation. Clean the cuspidor thoroughly after every patient. Brush the floor clean of any particles that may have collected. The nurse should scrub her hands with surgical soap and alcohol before the operation, and before handling linen.

Have a sterile hand towel ready on the sterile rack for the doctor, so that he does not have to open the cabinet door. All this makes for proper asepsis, and is a saving of time in the course of the day's work.

While one assistant is cleaning up the office, the operator can be busy in the next office with the next patient, with the other nurse in attendance. By this means no time is lost waiting for the office to be cleaned. When possible, the patient should be surgically prepared by means of oral prophylaxis to afford a sterile field for operation.

When the doctor is called on the telephone, take the message. In ninety-nine per cent. of the cases, the assistant can give the desired information. This rule also holds good when people call in person. Inquire if the visit is professional. If the caller informs you that it is a personal matter, ask his name, and if he refuses to give his name, or state his business, you may treat him accordingly, as he is probably an agent of some kind, or a beggar.

If necessary to inform the doctor, while he is operating, of a call, either personal or by telephone, write the message on a pad provided for such purpose, and do not impart your information to the patient in the chair.

When informing the doctor of the arrival of a patient, do not mention the name in the presence of the patient in the chair. Write the patient's name and time of arrival in the day book, and at the back of the chair show it to the doctor.

Use judgment in keeping patients from waiting, if possible. Thereby many moments may be saved in the course of the day.

#### EXAMINATIONS.

When the patient arrives for the first visit, an examination is made by the doctor, and recorded on the examination chart. Impressions are taken of the upper and lower jaws, and X-rays made of the entire upper and lower jaws.

If the doctor can give the assistant some idea of the extent of the work to be performed, the nurse can then make a series of appointments, six to ten, in advance. This will avoid the making of appointments after each sitting, and the patient is benefited by securing the hours and days preferred.

#### APPOINTMENTS.

When making appointments always insist on giving appointment cards. For all appointments made over the telephone, mail appointment cards to avoid mistakes, and it is a good plan to have

appointment cards confirmed in the appointment book by your other nurse. It is most embarrassing to have a patient appear at a time specified on the card, and find your entry in the appointment book is wrong. Also, it is a source of satisfaction, if the card and appointment book are found to be correct, to find it is the patient who made the mistake, and not yourself!

Keep a call list, and if a patient cancels an appointment, refer to the call list for filling in the time. By this means waste of time can generally be eliminated.

Try to remember the most convenient time for appointments for each patient. It is irritating to a patient to offer her a nine o'clock appointment, when she has previously told you she cannot keep an appointment before 11 A.M.

Business men, as a rule, desire morning appointments, or late in the afternoon, and cannot break into the busy part of the day.

Children's school hours must be considered, and appointments made to accommodate their time as much as possible, by giving them late afternoon hours and Saturday mornings.

Use only pencil for writing in the appointment book, as many changes are made in a week, and unless you are able to erase the notes, you will have a "messy-looking" book. At the end of the day, have a few moments' consultation with the doctor, especially in writing up the day's work. You may remember some detail the doctor forgot to enter, and by this means all charges will be entered.

#### KEEPING RECORDS.

Enter the name of every person who calls; also the telephone calls received, in the day book. This is most important, as it is a double check on the appointment book, and in checking up the day's work, a reminder of persons operated upon and fee to be charged.

Keep the day book posted to date, and send statements to all patients the first of every month. In case of misunderstanding, it is better to rectify or ex-

plain at the end of a month's service than at the expiration of six months.

Deposit checks and cash as soon after receiving them as possible, and permit a lapse of forty-eight hours after depositing before sending out receipts.

My employer has been in the habit of having an expert accountant audit the books once a month. This is a great comfort for all concerned, and at the end of the year, an easy method of calculating the income tax.

At different periods check up the last appointment of patients and send notification cards to those whose time has elapsed for prophylactic treatment, and also delinquents due for examination, and general periodical visits.

Orthodontia cases should be notified, monthly prophylactic treatments given, and appliances removed so the oral hygienist can thoroughly clean the teeth and bands.

This all comes under the daily duties of the nurse in charge, and if she is capable, she will attend to these things without being reminded by the doctor.

#### STERILIZING.

The possibility of the transmission of disease from one person to another, dentist or patient, through unclean instruments and appliances has long been recognized, and we cannot put too much stress on the necessity of thorough cleanliness and sterilization.

When a tray of soiled instruments is brought into the sterilizing room, the instruments are sorted and cement instruments are scraped clean of cement before being put into water. This pertains to steel, and will avoid oxidation. Then the instruments are scrubbed with a good cleanser, such as "Bon Ami" or "Orono," followed with soft soap and carbolic acid.

When the instruments are free from all deposits, mechanically clean and sterilize them by boiling twenty minutes, or in questionable cases thirty minutes. At the expiration of this time, the instruments are removed from the sterilizer and wiped dry while hot with a



sterilized towel, and lastly wiped with alcohol. They are then placed in a dry formaldehyd sterilizer until the end of the day, if the dentist has enough duplicates to permit this, and then replaced in their respective places in the cabinets. Sterilize instruments, napkins, dressings and towels in Autoclave. Having a place for every instrument, and every instrument in its place, is a standard of good management. Try to keep it so.

Keep up appearances by cleanliness, and thereby make a lasting impression on patients. It is said that butterflies and humming birds fly to the sunniest and most attractive gardens; try making your garden attractive to humans.

Great care should be exercised in the care of linen. Be careful not to spill acids, iodine or any medicament on them. No laundress can be expected to remove such stains without injuring the linen, and there is nothing more unsightly than pure white linen marred by stains or holes.

A common fault with many is to take a spotless white towel or napkin, or a linen headrest cover, and dust the furniture with it. Standardization in the office applies the same as in the home. Have clean dusters for dusting, cleaning cloths for wiping instruments, towels for the hands, and special towels to cover the patient's garments, and use each article only for what it is intended.

During special extensive operations, use good lightweight rubber aprons under the linen towel.

The care of linen is a distinct part of the daily routine, and by using separate containers, and the paper bag for waste, I find stains can be entirely avoided, if care be exercised.

#### THE SYSTEMATIC ARRANGEMENT OF INSTRUMENTS.

Have one cabinet for all instruments and requisites for amputations, or extractions and anesthesia. In another cabinet place all instruments required for orthodontia; and then in another cabinet all instruments for general practice.

Keep cements of all kinds in their respective places with spatulas and varnishes.

If you have two or more offices, have some plan of marking and arranging the instruments, so that you can distinguish which are to be used for Office 1, Office 2, etc. By this method time will be saved, and confusion eliminated in replacing sterile instruments in their respective places.

Keep all cotton, cotton rolls, cottonoid, gauze, swabs, cotton applicators, etc., in glass-covered jars, and glass dishes suitable to the sizes contained therein.

Saliva ejectors should be immersed in a glass-covered jar in a solution of distilled water and alcohol.

All cabinets should be thoroughly cleaned every four weeks, as the fine dust will work in, no matter how careful one may be in keeping the doors closed.

Have all nickel bright and polished, and a systematic cleaning of all nickel done thoroughly by the office man once a week with polish. During the week, just a dry wipe will keep it clean. Many offices contain "sterilizers" covered with filth and debris, that are a mockery of the word.

This precaution also pertains to the switch board: all attachments and connections should be taken from the cabinet, sterile, when ready to use. Do not leave attachments hanging exposed from day to day, and used on patient after patient.

When the day's work is done, turn off all electricity, water, and gas.

#### PERSONAL APPEARANCE OF NURSE OR ASSISTANT.

The assistant should be dressed in a white gown, and I wish to emphasize the necessity of keeping the gown *white*. Today the uniforms are furnished by the doctor for the nurses, and not having paid for them, some nurses find it unnecessary to keep them in repair, and do not seem to consider the expense.

It is to the nurse's credit to be neat



and clean in dress and person. It is very essential to be properly shampooed, and patients expect the same degree of cleanliness in the doctor's attendants as prevails in the general atmosphere and surroundings, and these, of course, should always be immaculate.

The nails should be carefully manicured, as unclean hands are especially repulsive to the patient.

Avoid wearing jewelry, except only the simplest when necessary. Do not wear a skirt so short that it detracts from the dignity of the uniform.

A common and objectionable habit of some nurses is to primp and fluff the hair, and adjust hair pins while in the operating room. If necessary, leave the room for such toilet duties, and cleanse your hands thoroughly before returning.

#### USEFUL HINTS AND SUGGESTIONS.

Do not converse with the patient unless it be on necessary business. Patients are not interested in your ailments, or family affairs, although they may be polite enough to listen to you. The patient's time is valuable, and so is yours; and if you perform your duties, there will be little time left for conversation, or magazine or book reading, or for embroidering and knitting.

Do not give telephone messages to house servants unless instructed to do so by the patient, as they are not responsible if the message is not delivered.

Dental nurses of today can fit themselves for many duties, and by applying themselves diligently can become proficient assistants in the laboratory for such work as plaster model making, casting, bridge work and porcelain work.

Study the idiosyncrasies of the patients. Try to remember their likes and dislikes. Some object to the saliva ejector, and after once speaking of a dislike, do not err by repeating the mistake at the next sitting. Some people have an aversion to the use of cotton, others to bibulous paper, linen, or rubber dam.

Study the supply catalog and familiarize yourself with the dental instruments. I have known assistants after

six years' experience in an office not to know a hatchet from a hoe excavator, or ball burnishers from flat burnishers. This discrimination of instruments is very essential. If you do not know the difference, you are unable to place proper instruments in the correct places. Standardization in arrangement cannot be practical unless you know every instrument and its use. By careful study, you will quickly learn the relation and position for each placement.

During the summer season, I find it good practice to prepare for the busy season by preparing supplies, making swabs, and sponges, applicators, cutting of base plate gutta-percha, Detroit wafers for impression cups, and any cleaning and rearranging of supply closets; filing of yearly magazines and preparing as many supplies as possible, to be ready for the busy season. Then it is a great comfort to replenish from the supply closet, and it eliminates ordering and buying when your time is taken up by more important duties.

There is always a class of patients who need to be educated, and a competent assistant will be a great asset in making explanations to patients when necessary, and the practice of the operator can thus be benefited to a great extent.

I wish to call attention to the nurse's attitude toward the operator. Jokes and side remarks are out of place in the operating room. Strict attention to business and respect to the operator and patient at all times is a mark of efficiency in conjunction with your knowledge of the work in general.

In closing I wish to state, that a dentist can no more dispense with the dental nurse or assistant, than an up-to-date business man can do a one-man business and do it well. It cannot be done. Go into an office where a man is without the assistance of one or more dental nurses, and you will at once notice that his office equipment and surroundings show neglect. Furthermore, aside from cleanliness, there are many times when the practitioner is handicapped in performing the simplest operation without the aid of an additional pair of hands.

Do not confuse the term "dental nurse" as I have used it, with the use of the term as applied to the oral prophylaxist. Many dentists call the dental hygienist a dental nurse, but I am referring only to the duties of the office assistant, who does no work in the patient's mouth whatsoever; but merely makes for greater efficiency in the dental office by assuming the responsibility of the many little details which can be so well performed by a woman of intelligence and tact, leaving the dentist free to do the important operative procedures. Such a woman makes herself invaluable to her employer.

We have been told that there are not enough dentists to serve even a small percentage of the people who require their services. If, therefore, the dental

nurses leave more time for the dentists to perform actual operative work, by relieving their employers of the many little things in a busy practice which can just as well be attended to by intelligent assistants, I feel that they may be considered in the light of true benefactors to humanity.

I hope in the near future, to see established a school for training such dental nurses or assistants. Such an institution would be of great benefit to the profession. The time will come when a graduate dental nurse will be in as great demand, if not greater, than the medical nurse of today. Financial returns worth while will encourage the young women of today to enter this field.

19 E. 69TH ST.

## Diseases of the Dental Pulp.

### IV. Treatment.

(Continued.)

By HERMANN PRINZ, M.D., D.D.S., Philadelphia, Pa.

(Continued from page 882.)

#### 10. Necrosis and Gangrene of the Dental Pulp.

Death of the dental pulp from any cause and subsequent infection resulting in putrefaction.

##### NECROSIS.

Death of the pulp may be caused by any one of the numerous disturbances as outlined under: etiologic factors of diseases of the dental pulp (DENTAL COSMOS, May 1919, p. 382), or it may be artificially produced by a toxic agent, usually arsenic trioxid. Gangrene of the pulp is the result of secondary putrefactive changes occurring in the necrotic

tissue. Both disturbances are primarily caused by a bacterial invasion, usually a streptomycosis of a mixed type, arising as a sequence of existing dental caries.

Clinically, necrosis and gangrene of the dental pulp may manifest themselves as any one of the numerous varieties as discussed below.

The clinical picture of necrosis or gangrene, if confined to the root canal proper, usually presents no visible signs of derangement of the tooth, except discoloration of its crown, or causes inconvenience to the patient. As soon as the products of the putrefactive process, however, penetrate into the periapical tissues marked disturbances arise,



which manifest themselves in the majority of cases as an acute dento-alveolar abscess that at some future period may assume a sub-acute or chronic type. If the periapical infection is of a very mild type, the vital reaction of the disturbed pericementum institutes a process of defense resulting in a chronic proliferating pericementitis, usually referred to as a granuloma. Should this granuloma contain epithelial cells, the mild irritation may cause proliferation of these latter tissues. The epithelium grows in all directions and finally forms a closed capsule. As this epithelium is of the same type as that of the oral cavity, it secretes mucus which collects in the interior of the granulomatous sac and by pressure from the accumulated fluid the surrounding bone is absorbed and a radicular cyst is the usual sequence.

A clear conception of the chemistry and the bacterio-pathology of the various manifestations as they occur in dead pulp tissue is of the utmost significance in regard to the future treatment of this disturbance, hence a detailed discussion of this most important phase of the pathology of infected root canals is of vital importance to the clinical practitioner.

The dental pulp consists of connective tissue, nerves, and bloodvessels. All animal tissues are essentially composed of cells, and the constituents of these cells consist of proteidogenous matter, lipoids, salts, and water. Only a very few elements enter into their make-up, *i.e.*, nitrogen, oxygen, carbon, hydrogen, sulfur, and very little phosphorus and iron. The tissues containing nitrogen are referred to as nitrogenous substances, or proteins, while non-nitrogenous substances are spoken of as carbohydrates and fats.

The normal pulp tissue is composed principally of proteidogenous material, and so far no carbohydrates or free fats have been isolated from it. The proteins are the most complex bodies known to chemistry; they are usually colloidal in their nature, and are composed of molecules that differ widely in their weight and size. The average protein molecule

approximately furnishes the following constituents: Carbon, 51 to 55 per cent.; oxygen, 20 to 24 per cent.; nitrogen, 15 to 17 per cent.; hydrogen, 6.8 to 7.3 per cent.; sulfur, 0.3 to 0.5 per cent., and very small quantities of phosphorus and iron. The proteins may be decomposed by acids, alkalies, superheated steam and ferments. These latter substances are found extracellularly in the digestive juices and intracellularly where they become manifest in autolysis.

In the decomposition of the pulp we are principally concerned with the intracellular (autolytic) and bacterial enzymes. The ferments which are secreted by the leukocytes during the various inflammatory processes within the diseased pulp are the digestive agents, as Kantorowicz has shown. Death of the pulp—necrosis—is the precursor of pulp decomposition—gangrene.

Whenever healthy tissue becomes irritated by physical or chemical (including bacteria) means to such an extent as to cause intense disordered cell nutrition, death of the cells results. This process is known as necrosis. A pulp may accidentally die of its own accord through any of the above causes, or it may be intentionally killed by a caustic, usually arsenic trioxid.

In general pathology four varieties of necrosis are usually recognized:

1. *Coagulation Necrosis.* This form of necrosis results from the coagulation of fluids that have entered into or are present in the pulp, and that contain coagulable substances, that is, the soluble colloidal material is transformed into insoluble modifications. The change of fibrinogen into fibrin is an important factor in this procedure. The pulp assumes a dry, firm appearance, and is usually of a yellowish color. When blood enters into the root canal after the removal of a coagulated pulp, it usually becomes quickly clotted. Coagulation necrosis may be caused by heat, phenol, corrosive sublimate, and other chemicals, and it is rather seldom met with in the dead pulp.

2. *Liquefaction or Colliquation Ne-*



*erosis.* This occurs principally in the central nervous system. The nature of this form of necrosis is not quite clear, and probably edematous infiltration and enzyme action have much to do with it. It is very rarely found in the dead pulp. Suppuration should not be confounded with it. It is principally due to bacteria, or to the action of chemic substances (aseptic suppuration).

3. *Caseation Necrosis.* This term is applied to a coagulation necrosis which resembles an emulsion of fat and water, and has the appearance of cheese. The coagulum is made up of protein derivatives, considerable quantities of fat, water, etc. Fatty degeneration of the pulp as a whole is rarely met. The fat globules are derived from the disintegration of cell protoplasm, which contains fat as a metabolic constituent. The action of proteolytic enzymes is probably largely responsible for these changes. Caseation is most frequently found in pulp decomposition.

4. *Fat Necrosis.* This specific type of necrosis is restricted to fat tissue and is characterized by a splitting of the fat into fatty acids and glycerol. As the normal pulp does not contain free fat, fat necrosis is probably never observed in its pure form in this organ.

#### GANGRENE.

Gangrene is the result of secondary putrefactive changes occurring in necrotic tissues. Two forms of gangrene are usually recognized in general pathology, *i.e.*, moist and dry gangrene. Moist gangrene depends on the presence of water, while the absence of water denotes dry gangrene or mummification. In dry gangrene nearly all further changes cease, while in the moist form the autolytic changes continue. A totally gangrenous pulp presents a mass of debris in which lime concretions, fat droplets, crystals of fatty acids, of hematoïdin and of triple phosphates, numerous bacteria, and various pigments are the only discernible elements. The fat droplets are partially produced by fatty degeneration of the myelin sheets of the nerve fibers

and partially by disintegration of the cell protoplasm and dead bacteria. The latter organisms apparently contain fat as a metabolic constituent in the form of lipoids. In the great majority of cases of pulp disintegration progressive moist gangrene is predominating.

In clinical practice complete moist gangrene is not always found, and a pulp may be partially or totally gangrenous. In partial gangrene one part of the pulp may be totally putrescent, while the other part may be still in a state of severe inflammation. A fairly distinct line of demarcation may be observed between the dead and the inflamed part of the pulp. Through necrobiotic and secondary putrefactive changes the entire pulp will finally become totally gangrenous.

#### PUTREFACTION.

When dead protein material is subjected to the action of bacteria and ferments the process is known as putrefaction. Putrefaction in its early stages is principally a process of hydrolysis and oxidation, and closely resembles tryptic digestion, that is, certain ferments, enzymes, and products of bacterial activity are concerned in the cleavage action of the protein molecules, a process which is closely allied to the changes occurring in the intestinal tract. The preliminary action of proteolytic enzymes on the dead protein molecules results in the formation of albumoses, peptons, and polypeptids. Further decomposition is productive of various amino acids, *i.e.*, fatty or aromatic acids in which one or two of the hydrogen atoms have been replaced by a basic ammonia radical. It is claimed by Czapek and Emmerling that these amino acids furnish excellent nutrition for bacteria.

The amino acids are further decomposed by the elimination of ammonia and by the splitting off of carbon dioxide, respectively, deamination and decarboxylation occurs. In the ammonia elimination the end-products are found to consist of the free fatty acids, corresponding to the amino acids from which they are derived, *i.e.*, acetic, propionic,

butyric, valerianic, caproic, and  $\alpha$ -amino-valerianic acid, and of the aromatic acids: phenylpropionic, hydro-p-cumaric, skatol-acetic and succinic acid. The further oxidation of the various fatty and aromatic acids results in the formation of many paraoxy-acid compounds, i.e., paracresol, phenol, etc.

Sulfur is set free during the breaking down of protein substances; it partially unites with free hydrogen to form hydrogen sulfid, and partially with free CN groups to form various sulfoeyanids of a less toxic nature. In the course of their decomposition the aromatic products furnish indol and skatol; indol finally combines with free sulfuric acid and forms indican. The latter substance furnishes an important diagnostic indicator of the process of putrefaction.

The products of decarboxylation are amines (tyramin and histamin) and diamines (cadaverin and putrescin) which latter group is included among the so-called ptomains. The aromatic and fatty acids, but especially skatol and indol, are largely responsible for the vile, fetid odor which accompanies the putrefaction of protein material. The end-products are water, ammonia, hydrogen, hydrogen sulfid, and carbon dioxid. This last stage of complete decomposition is rarely reached in the putrefaction of the pulp tissue. The

taneously with these acids. It may be observed, however, that in the union of two amino acids, an acid radical and a basic radical are liberated, which, under certain conditions, gives rise to amphoteric reactions.

The bacterial phase of pulp decomposition is of even greater clinical significance than its chemistry. Hand in hand with the progress of chemie decomposition, the bacteria that are present in the pulp tissue give rise to many substances, such as toxins, endotoxins, bacterial proteins and indirectly ptomains.

Mayrhofer<sup>1</sup> furnishes the following statistics concerning the presence of micro-organisms in dead pulp tissue:

Organisms found.	Number of times found.
Streptococci .....	70
Streptococci and rods .....	44
Streptococci and staphylococci ..	14
Streptococci, staphylococci and rods .....	10
Streptococci and yeast cells ....	5
Streptococci, rods, and yeast cells	3
Staphylococci .....	3
Staphylococci and rods .....	1
Rods .....	2

Concerning the presence of these various micro-organisms in open and closed putrescent root canals, Mayrhofer obtained the following data:

Organisms found.	Number of times found in 53 cases of open root canals.	Number of times found in 51 cases of closed root canals.
Streptococci .....	27	31
Staphylococci and rods .....	18	6
Streptococci and staphylococci .....	3	1
Streptococci, staphylococci, and rods .....	1	5
Streptococci and yeast cells .....	1	
Staphylococci .....	1	2
Staphylococci and rods .....	1	
Rods* .....	1	6

reaction of a putrescent pulp is probably always alkaline, and the necessary carbohydrates which would furnish acids as by-products of fermentative changes are absent. The acids that are formed during the decomposition of protein matter are readily neutralized by the many basic materials that are created simul-

The influence of bacteria, *per se*, is of little importance as far as pathogenic disturbances are concerned, and the harm that is caused by the presence of these organisms is due to the many

<sup>1</sup> MAYRHOFFER. "Principien der Pulpagan-grün," 1909.



chemic products that result in one way or another from their metabolic processes. The many offensive products that accompany putrefactive changes are attributed to anaerobic conditions, while in the presence of oxygen usually less ill-smelling compounds are formed. Some observers claim that only strictly anaerobic bacteria are concerned in the putrefaction of proteins. The autolysis of leukocytes depends principally upon obligate anaerobic micro-organisms. Purulent pulpitis and gangrene, according to Idman, are primarily dependent upon obligate anaerobic bacteria and they play a most important rôle in these processes. The streptococci and staphylococci are both aerobic, and only optionally anaerobic organisms. The presence of malodorous compounds is readily perceived by entering into a closed root canal containing a putrescent pulp.

The poisonous chemic products of bacteria according to Wells may be conveniently divided into ptomains, toxins, endotoxins, and bacterial proteins. The ptomains, *i.e.*, soluble basic nitrogenous substances, resemble vegetable alkaloids and are derived from protein material decomposed under the influence of enzymes and of putrefactive bacteria. For some time past it was believed that ptomains were the cause of infectious disease, but it was soon found that they could be removed from cultures of pathogenic bacteria without destroying the poisonous nature of the latter. At present the chemistry of bacterial intoxication is more clearly worked out, and, as a consequence, ptomains are of much less interest than they were twenty years ago. In decomposing protein material quite a large number of ptomains are more or less present as a result of the cleavage action of enzymes and other hydrolytic factors. Cadaverin, putrescin, sepsin, muscarin, leucin, tyrosin, neuridin, etc., are some of the more important representatives of this interesting group. Ptomains do not act as specific poisons, but many produce diseases when taken into the body with the food in which they have been produced by bacterial activity. It is claimed

that pathogenic bacteria present in living tissue cannot produce sufficient ptomains to seriously affect the health of the individual. Moist gangrene of the pulp is a ready source of ptomain formation.

#### TOXINS.

Certain pathogenic bacteria produce definite synthetic poisonous substances of a specific nature known as toxins. Toxins are the secretions of cells, and are readily taken up by the surrounding tissues. The intense poisonous nature of these toxins is responsible for the chief symptoms which we recognize in infectious diseases. The bacillus of diphtheria and tetanus are known to secrete typical toxins. These toxins are always of the same poisonous nature, no matter how or where they are obtained, while the ptomains vary with the nature of the substances from which they are derived. Toxins are very labile substances, and are readily destroyed by heat, direct sunlight and oxygen. Antibodies or antitoxins can be prepared against toxins, but not against ptomains. As very few bacilli are known that produce specific toxins, it is plain why so few true antitoxins have been artificially prepared.

Again, bacteria may produce poisons within their own cell bodies; they are not usually secreted by the cells, but are also specific in their poisonous nature. These bodies are known as endotoxins. As yet no antitoxins have been prepared against endotoxins, and, as most bacterial diseases are caused by endotoxins, the preparation of sera has been greatly retarded, and consequently, immunization against many infectious diseases is apparently impossible. Furthermore, bacteria contain poisonous materials which form an integral part of their protein constituents. These poisonous materials are not soluble, and apparently do not produce diseased conditions. The bacterial substances themselves may, however, produce inflammation and pus, or even necrosis, when injected into living tissues. These substances are called bacterial proteins.



## DIAGNOSIS.

In complete necrosis or gangrene of the dental pulp when confined to the root canal proper, no painful symptoms are manifested; as soon as disturbances of the periapical tissues occur marked pain with all the additional symptoms of an acute inflammation are to be observed. The dentin has lost its sensation completely; an explorer may be inserted into the root canal without causing a painful response. Only in partial necrosis or gangrene is pain felt as soon as the line of demarcation is reached. The color of the tooth is markedly altered, *i.e.*, the tooth has lost its life-like luster and it may have changed from the normal to any shade toward dark gray. Transillumination furnishes a dull shadow picture, while temperature changes are not manifested by dead pulp tissue. The percussion sound of a tooth containing a dead pulp is dull as com-

pared with the clear ring obtained from a sound tooth; the tooth is usually slightly loose in its socket. The roentgenogram of a tooth containing a necrosed or gangrenous pulp is negative. The faradic current produces no response whatsoever from a dead pulp; however, great care should be observed in not touching a metallic filling with the electrode or placing the latter too near the gum line, otherwise a painful reaction is obtained.

## PROGNOSIS.

As necrosis or gangrene indicates dead pulp tissue, a prognosis cannot be considered. A favorable prognosis of the involved tooth, however, may usually be rendered, as in most instances suitable treatment of the infected root canal and its subsequent filling will restore the tooth to proper usefulness.

40TH AND SPRUCE STS.

## Some Examples of the Origin and Specialization of Tooth Forms.

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IN considering the origin and development of a tooth or a set of teeth it is necessary to go back to the beginning of things.

The infinite variety of forms and numbers of teeth ranging from six in the fully grown elephant to the thousands and thousands in the mouth of the sea-bass, and in every case they are the kind that best serve the possessor in its struggle for existence and the propagation of its species. The perfecting of these organs has required millions of years, and no other organs in the body are perhaps of more importance in promoting the welfare of a particular fam-

ily and perpetuating the very existence of that family than the teeth.

In the classification of extinct species the teeth have always played an important part. Their forms and functions are much varied, ranging from the broad flat surfaces of the herbivora used for the purpose of masticating tough herbage, to the small delicate hair-like forms in some fishes and the specially developed canines and incisors used exclusively as weapons of offense and defense. The various shapes, sizes and functions of teeth have been brought about by two well-known laws, the influence of heredity and environment, and

are in accordance with the law laid down by Darwin—"that if the especial development of an organ be of benefit to a species that organ will go on improving until it reaches its highest stage of development, but if an organ be of no use to its possessor then it gradually atrophies and disappears." Environment depends upon climate and circumstances.

Climate has always been an important factor in the development of both plant and animal life. As it controls the growth of plants and the herbivora are dependent on these plants and foliage and the carnivora are dependent largely upon the herbivora, we can see how climate controls or at least influences all animal life. An example of this is found in the highly developed canine of the wild boar. This tooth was absolutely necessary to his existence when in the wild state, and became the useless tusk after he had degenerated through domestication.

Heredity is a well-known law more or less stable. It is an influence transmitted from parents to offspring through the chromatic fibers in the germ cell. This influence, energy or whatever it may be, is consistently transferred through a line of cells from the human ovum to the offspring. The degree of this transference is uncertain, but if it be of benefit to one receiving it, it is constant in a greater or less degree.

To ascertain the causes which have produced the different forms and functions of teeth one must go back to the beginning of the world. It is estimated that this beginning was at least 100,000,000 years ago. The age is arrived at by the amount of salt in the ocean, erosion, the formation of sedimentary rocks and deposits of silt at the mouth of rivers. For 60,000,000 it was in a state of chaos incapable of supporting life in any form, but having all the necessary elements and gradually preparing these for the great event. We are unable to conceive a period of 60,000,000 years, but time is the cheapest thing in nature and she is very prodigal in spending it.

During these millions of years stupendous changes were taking place both within and on the surface of the earth. Rumbblings of earthquakes were constant, volcanoes were pouring out rivers of hot lava, upheavals of some parts and sinkings of other parts of the earth were continually going on. Tremendous storms of rain, accompanied by terrific thunder and lightning, constantly beat upon the heated parts to be immediately vaporized, forming dense black clouds of smoke and steam, these in turn to be condensed and again returned.

After millions of years of these stupendous changes a crust was formed to a greater or less extent over the earth, composed of both sedimentary and igneous rocks. Now these rocks in turn were being gradually disintegrated by the same conditions that helped to form them. Heat and cold, wind and rain, chemical action and reaction were gradually forming a soil.

We think of these things being active only in a world in its infancy, but they are going on today as then. The volcanoes and earthquakes of Central America, the rising and sinking of the Aleutian Islands, the valley of 10,000 smokes in Alaska, are examples of a world in the making, but on a much smaller scale.

It required 60,000,000 years of these tremendous cataclysms that a tiny bit of protoplasm might be born. Nature had striven through ages to produce it; thousands of times she had almost succeeded. Then one day in a quiet corner somewhere on this old earth there was a combination of oxygen, nitrogen, hydrogen, carbon and possibly sulfur in just the proper proportion, and under the influence of the warm rays of the sun a compound was formed that had the power of movement and assimilation in itself.

Here the first living thing was formed—a bit of protoplasm. It probably lived but a moment, but as a living thing had been created so it could and would be created again, for this is the law of the universe.

After repeated trials, extending over



perhaps thousands of years, it became possessed not only of the power of movement and assimilation, but differentiation also. With this new phenomenon it is a short step to the time when its boundary became circumscribed by a wall, a nucleus was formed with chromatic fibers and the first cell was born. A new function is now given it—that of reproduction.

This, our first bit of protoplasm, probably differed but little from any protoplasm of today; but from that mass came life that endures the intense cold of the polar region, the terrific heat of the deserts of Africa, the tremendous pressure at the bottom of the deepest sea and on top of the highest mountain, for everywhere is life—the life that came from that first cell; and in that cell is something that will 40,000,000 years later, go to form a man and the central incisor in the mouth of that man.

There is a difference of opinion in regard to the origin of life, some believing it originated as described above with variations, others that the first thing had breathed into it the breath of life by Almighty God. Another theory is that the first living thing was brought from another planet in meteoric dust or perhaps propelled by sunbeams. Anyone, of course, may believe any or none of these theories, but when a half dozen masses of protoplasm, in which it is impossible to detect the slightest difference, are placed under proper fertilization one will develop into a tree, another a rose, another a horse, another a man, and still another an elephant.

The changing of that bit of protoplasm into a man or into a beautiful rose is to me a greater thing, an act of more stupendous importance than the creating of a bit of matter that is barely alive. We all know how sunshine and the elements sustain and perpetuate nearly all living things; why can they not originate the thing they so well sustain?

After the cell was firmly established its first step in evolution was its progression into bacteria. These bacteria were similar in some respects to the bacteria with which you are familiar, but

with different functions. As there was no organic life outside of themselves on which they could feed in that lifeless world there were no pathogenic bacteria, but there were developed peculiar organisms known as primitive feeders which lived on inorganic chemical compounds. From these came the highest forms of bacterial life in which free oxygen is an essential. These bacteria played an important part in the formation of the world. The limestone in all parts of the world, the chalk cliffs of England, iron ore, sulfur and other chemicals owe their formation largely to bacteria and algæ.

After the bacteria came blue-green algæ similar to the algæ found in ponds at the present day and these, according to Ehrenberg, rank with the bacteria as earth-forming agents during a period of 40,000,000 years. The algæ were followed by the protozoa, single-celled organisms like the amcebæ which were also earth builders. Following these were the invertebrates—worms and crawling things of many kinds including trilobites, crustaceans, mollusks, sponges. During this time horny excrescences appeared in the mouths of some of the crawling things which were not teeth, but the forerunners of what would eventually develop into fully formed teeth.

There were two distinct kinds of worms—swimming and burrowing. From a swimming worm to a fish is but a comparatively short step. Some changes in the general structure, the evolution of fins, tail and gills with the ability to live under water which these give him and the change is complete. "The origin and evolution of fishes is steadily progressive and reaches the greatest extreme of form and function."

About this time the first fully formed tooth appears—a simple cone. From this cone with combinations, additions and modifications the many complex patterns of teeth found in the mouth of animals all over the world have arisen. But the cone with variations remains fairly constant in the mouths of fishes. Nearly all species of fishes live on fishes. A live fish when caught is very



slippery and hard to hold, but the cone-shaped tooth is especially adapted to hold it until it ceases to struggle and can be swallowed. Curve this backward and it is a weapon hard to improve for the particular purpose for which it was designed, first as a weapon, second as a prehensile organ in obtaining food.

#### SPECIALIZATION IN TOOTH FORM.

There are four distinct ways in which teeth are attached to the jaws: First, by the roots being surrounded by a membrane through which they are attached to an alveolar process; second, by ankylosis to the bone; third, by fibrous membrane, and, fourth, by elastic hinges.

There are some excellent examples of specialization found among the fishes. The teeth of the shark are attached to the jaws by fibrous bands. There are eight or ten rows in different stages of development lying on the lingual sides of both jaws. This band moves from the lingual to the buccal carrying the teeth with it. When each row reaches the upper border the teeth are at their height in development and usefulness, standing in nearly an upright position. As soon as they are badly worn they are torn or cast off, when another row takes its place so that there is always a row on the border in the highest state of efficiency.

#### FISHES.

The shark's teeth are not made for seizing and holding living prey but for slicing off huge pieces of flesh and bone, as carving off a man's leg or cutting another fish in two parts. Fishermen catching tarpon off the coast of Florida will be surprised that the struggles of the hooked fish suddenly cease and on pulling in find only a half or two-thirds of their catch on the hook, the balance having been taken by a shark. This family is among the oldest of the fishes. In prehistoric times they grew to an enormous size and the arrangement of their teeth and their attachment to this band make one of the most ingenious methods

of supplying substitutes for the worn-out teeth and keeping these weapons in a state of greatest efficiency. The nar-whal is an example of the specialization of the right central incisor of the upper jaw which attains a length of ten or twelve feet. This is used wholly as a weapon for plunging into the soft bellies of other fishes. The left incisor may attain a length of two or three feet. The extraordinary development of these seems to serve the purpose of an entire set, for the balance of the teeth have completely disappeared.

In contradistinction to these examples of special development is the sturgeon. This fish at one time was supplied with a full complement of teeth but he was never aggressive in his habits, consequently he was a prey to the voracious varieties like the pike and trout. As a result when attacked he ran away or swam away, usually going to the bottom or to the shore where he would dig his head into the mud and ooze. After many years he learned that stirring the mud so roiled the water that he was hidden from his enemies and soon he learned that here was his haven of safety. Then he commenced hunting food, for this is the one great essential among all the wild things, and found there were the most delicious bugs and worms in this mud. With safety and food here his home was established and to this day he is a bottom feeder. Teeth were not a necessity for him in procuring this kind of food so they have completely disappeared and a mouth shaped something like suckers has taken their place. Here comes in the old law: if an organ is of no use to its possessor it will disappear. Many examples of specialization are found among the fishes but these are sufficient to show their great adaptation. "In biological evolution millions of variations have been produced that one useful one might occur."

#### AMPHIBIANS.

The fishes had their origin about 18,000,000 years ago. The fishes were followed by amphibians. Osborn says

that the transition was a matter of many thousands of years, but today under the influence of the hereditary chromatics it is repeated in a few days in the metamorphosis from the tadpole to the frog. In the amphibians we have the first appearance of legs. Their teeth were similar to those of fishes and present no particular specialization. Following or contemporaneous with the amphibians came the reptiles though these were so closely related that the principal mark of distinction was that the reptile could live only on land. From the reptiles came the birds and the great family of mammalia.

In the early period of transition birds had genuine teeth inherited from their reptilian ancestors, but now they have given way to horny excrescences—a product of the epiderm. Turtles, lizards, snakes and crocodiles are direct descendants of the monstrous lizards which lived in early Mesozoic times, 9,000,000 years ago. They were monsters of the most hideous type with immense jaws carrying long strong cone-shaped teeth used as weapons of offense and defense, killing and eating anything weaker than themselves and they in turn being killed and eaten by those stronger than they. They inhabited the country upon which we are now standing, as this was the shore line of an immense inland sea. One rare specimen was excavated near West Colfax in this city and several near Golden. The country near Canon City has also been prolific in its yield of these reptiles. Some excellent examples of specialization of the teeth are found among the reptiles, especially among the snakes. The ordinary rattlesnake furnishes a good example. Originally the teeth of all snakes were cone-shaped like their predecessors the fishes and for the same purpose.

In the rattlesnake it seems as though the ordinary cone-shaped teeth were not sufficiently good weapons. Perhaps from too many enemies or scarcity of food there was danger of extinction. Nature for some reason desired the perpetuation of this particular species therefore she supplied these snakes with a poisonous

saliva. This helped, but when he struck his teeth into living flesh it filled the holes so full the saliva could not readily enter; then to remedy this Nature made a groove running the long axis of the tooth so that the saliva flowing through this groove could easily enter the wound. This method works satisfactorily in some snakes today, notably the cobra of India. Many lives and thousands of dollars worth of stock are sacrificed annually from the bite of this species. The cobra is the only snake of which I have heard that deliberately goes on a hunt for a victim and after finding it, strikes hard, setting its fangs deeply into the flesh and hanging on so that it is shaken off with much difficulty. The reason is to give the saliva time to pass down into the wound where it is very liable to result in death, as the cobra is one of the most venomous of reptiles.

But for some reason this process was not satisfactory for the rattlesnake. In his case the groove, after thousands of years, became surrounded with dentin, leaving a tube running through the tooth precisely like a hypodermic needle. Attached to the upper end of the tube is a duct. The duct leads to glands that lie under the mucous membrane and these secrete a deadly poison. These glands have contracting muscles attached to them. Armed with these weapons the snake lies coiled and on account of his coloration blends almost perfectly with his surroundings, making it difficult to see him. Beside a trail traveled by rats, young rabbits or prairie dogs he patiently waits until his prey comes near. He strikes and immediately the poison sac contracts driving the poison into the wound. He again waits, knowing his victim has not gone far, and he proceeds to dine at his leisure. Usually when a rattlesnake strikes the fang is broken off and—here is one of the marvelous things in specialization—a new fang within three or four hours has taken its place and he is again fully armed. Lying on the lingual side of the upper jaw are four or five new fangs in all stages of formation with one al-



ways ready to take the place of the one lost. Originally the rattlesnake had a full complement of teeth. With the possession of the poison fang they became useless and have nearly disappeared. A few rudimentary ones only remain that are of no use to their possessor.

A snake of South America, which inhabits the thick jungle-like forests of that country, lives in the tree-tops and feeds on the eggs of birds. His teeth have entirely disappeared but in the upper part of his throat a cartilaginous protuberance has grown so that the shells of the eggs in passing over it are broken, putting them in best condition to enter the stomach and be digested.

#### MAMMALIA.

Chronologically from 18,000,000 to 20,000,000 years have elapsed since the fishes originated. From the fishes came the amphibians, from the amphibians came the reptiles, and from the reptiles came birds and mammals including the genus *homo*—man. The mammalian group originated about 3,000,000 years ago and in this group are found the greatest variety and greatest extremes in specialization of the teeth to be found in any group. They inhabit the earth, air and water. Bats are an example of those who live in the air, dolphins, porpoises and whales of those in the water, while those living on land are innumerable.

In the classification of the mammalia it is sometimes very difficult to determine to which family, species or sub-species they belong. These groupings to a considerable extent may be dependent upon the teeth and the teeth dependent upon environment and the environment upon climatic conditions. The climate influences the grasses and herbage upon which the herbivora feed and they were compelled to travel hundreds and sometimes thousands of miles to obtain this food. The carnivora fed upon the herbivora so they in turn were compelled to follow, and among the carnivora were our ancestors—man who at this time was exclusively a flesh eater and

compelled to follow the migrations of these animals to obtain food and what little clothing he required.

Climatic conditions have been greatly influenced by glacial periods, these periods having a tremendous influence upon the flora of the world. There have been four great glacial epochs: the descent of the ice-cap, the time it remains stationary and its retreat required in the first three glaciations about 50,000 years each and in the last 25,000 years. The interglacial periods when the ice-caps had retreated to the polar regions, through one of which we are now passing, were periods ranging from 50,000 to 150,000 years. During these periods of glaciation the ice-cap, roughly speaking, covered Norway and Sweden, the great part of Germany, Northern France, all of England, excepting the southernmost tip, Russia as far south as the Black Sea, and in the United States, all New England, New York, Pennsylvania, well down into Ohio, practically covering Michigan, Wisconsin, Nebraska and the mountainous parts of Colorado. The moraines, the result of the action of the glaciers, can be seen almost anywhere in the mountains in the northern part of the State. This ice-cap had a great influence upon the climate in that part of this world. It was similar to that of Alaska or Greenland today. The tundra of the Arctic region with its mosses, shrubs and vegetation became indigent to the northern United States and Europe.

These changes in climate and consequent changes in vegetation had a tremendous effect on the mammalian life of the world, and the changes in the teeth to meet these new conditions were of the utmost importance.

Africa and Asia have been the great nurseries for originating and developing new species among the mammalia. Elephants, rhinoceroses, hippopotami, lions, tigers, leopards, jackals and wild dogs originated there; but Europe was at one time plentifully populated with these animals which had migrated from Africa and Asia. In the United States elephants ranged from northern Alaska to



the Atlantic Ocean and south into Mexico. It is believed that camels with the horse originated in America. Among the carnivora were the sabre-tooth tiger and great wolf besides most of those that are here today.

Then the geographic map was considerably different from the one we now know. Europe and Africa were connected at Gibraltar and the island of Sicily, making the Mediterranean into a vast inland sea but furnishing bridges over which animals could pass from Africa to Europe. Asia was connected with America by the Aleutian Islands or across Behring Strait connecting East Cape to Cape Prince of Wales, thus separating the Arctic and the Pacific Oceans. These animals driven out of Africa by a severe drought, making food scarce, passed into Europe across Asia, across Behring Strait into North America where they became numerous. While making their homes in Europe they passed through one or more glacial periods. To protect themselves against the severe cold one species of elephant developed a thick coating of hair and became the hairy mammoth; the rhinoceros grew a hairy coat of wool and became known as the woolly rhinoceros. Before and since that time a thick skin seems to afford these animals sufficient protection. The growing of the wool and hair are excellent examples of the effect of environment. Had they stayed in Africa they would never have needed these extra coats and they never would have been grown. "The elephants afford an example of almost mechanical perfection in the occlusion of their teeth," but this perfection was obtained only after millions of years. Twenty million years ago there roamed in Africa an animal similar to a hog or more like the tapir of South America and weighing 300 or 400 pounds. His habits were herbivorous. He had a very short neck and long upper lip which enabled him to reach the grass and shrubs upon which he fed. He had a set of teeth corresponding somewhat to the herbivora of today but with upper and lower tusks of considerable length. During thou-

sands of years probably under the influence of the thyroid and pituitary glands he increased in height but his neck remained about the same. Now in order to reach his food his upper lip from the constant stretching elongated very greatly. Finally after a million or more of years he attained a height of ten to twelve feet with but little lengthening of the neck but a great elongation of his trunk or proboscis, still enabling him to obtain his food from the ground. He always was at first a hulking, lumbering beast with no weapon to protect him from his enemies.

Nature realized that there was danger of extinction unless a weapon could be provided. This resulted in an extraordinary enlargement of the upper central incisors resulting in the tusk which attained a length of ten or more feet in the imperial elephant. These tusks serve as weapons and for pulling down limbs of trees so foliage can be obtained, and digging up roots for the same purpose. The tusks when first erupted are covered with a thin coating of enamel which, however, is quickly worn away leaving the softer dentin exposed and this in turn is rapidly worn shortening the tusks. The entire tooth would quickly be worn away were it not that the pulp is of the persistent type which continues to form new dentin throughout the life of the elephant and keeps the tusks to their normal length. This is a fine example of specialization.

The molar teeth of the elephant are made up of a series of transverse plates composed of enamel, dentin and cementum. These wear unevenly, the enamel, on account of its hardness, wearing more slowly, so these plates stand higher, with the dentin and cementum somewhat lower, making a grinding surface similar to the upper and lower stones found in an old-fashioned grist-mill but a perfect machine for the work for which they were intended. These molar teeth have an unusual method of eruption. They seem to develop at the junction of the ramus with the body of the jaw and move forward. "The first tooth appears and begins to wear; soon

afterwards the second one appears behind and gradually pushes the first one forward so that by the time it is worn down to the roots it is pushed out of the jaw. The third comes up behind the second and at length replaces it until the last one late in life has taken sole possession of the jaw" (A. P. Hay). After about forty years he has but six teeth—four molars and two incisors, his tusks. The balance of his teeth, with the development of his trunk which is used as a prehensile organ taking the place of the incisors in cutting off leaves and grasses, have completely disappeared.

Elephants were numerous in North America at one time, ranging from the most northern shore of Alaska south to California, eastward to New York and south as far as Tennessee, a few going into Mexico.

Near Los Angeles on what is known as Rancho La Brea there was a depression or hollow in the earth in which there was a deposit of very sticky asphaltum. Oil would collect on top of this and in the moonlight it resembled water. The country was then, as now, very dry with water scarce. An elephant roaming the country would see the oil glistening in the moonlight and would rush to it to slake his thirst. Plunging one foot into the mass he would commence to sink, would put in his other foot to pull the first one out and both would be held as in a vise. This would be the beginning of the end, for anything once caught had slight chance of getting out again. He would struggle desperately and trumpet. His trumpeting would be heard by the canines and felines who are always near where the herbivora range. First to arrive would be the sabre-tooth tiger who would spring upon the back of his helpless victim and with his knife-like tusks would open the large arteries and veins in the neck and drink his fill of blood. The tiger might be followed by the great wolf who would dispute possession with him. This would be resented and a fight would ensue. One of them would be forced off the elephant and as soon

as he struck that sticky mass his doom was sealed and he gradually disappeared. After these two kings of the wilderness would come bears, coyotes and smaller carnivora to feast upon the remains. After the animals had gotten all they could then would come the birds of prey, the condor, eagle, hawk, and some would pay tribute to the asphaltum by leaving their bodies. In the excavation of this pit in an area fifteen by twenty-five feet and thirty-five feet in depth, bones representing seventeen elephants were found. Besides the animals mentioned above were found horses, camels, giant sloth, lions and many smaller species.

The sabre-tooth tiger is another excellent example of tooth specialization. His two upper cuspids grew to a length of six or eight inches with serrations on each edge making a very effective weapon. These nearly made him king of the animal kingdom for thousands of years; but a curious thing has recently been found out, namely, that these sabres in the latter part of his existence grew in such a manner that it was impossible for him to close his teeth together. The result was he had to live on blood, as it was impossible for him to cut off pieces of flesh. If this be true it shows that his teeth which gave him his supremacy when normal were one cause of his extinction when overdeveloped. To show how numerous the species was in North America 2000 specimens were dug up in Rancho La Brea.

Another example of specialization: Back in Eocene times or before, a huge animal somewhat resembling the prehistoric lizard roamed the shore of the primitive ocean. He had no special weapons of defense, consequently he was in constant danger from the carnivora which had the same habitat. He was herbivorous, living on the shrubs and grasses found in the marshes formed from tidewater. He was constantly preyed upon and this, for safety, drove him into the shallow sea. As a necessity he commenced feeding upon the sea plants and these finally became his chief diet. There were many worms and bugs



upon these plants and after a while he liked the plants better for this reason. Long ago he had learned to swim so that now he lived all the time in the water. He lost his taste for any form of plants but lived exclusively upon the small animal life which abounded so profusely in the ocean at that time. This went on for many thousands of years and a remarkable change took place. He grew a tail like a fish, his forelegs became flukes serving as fins and he is now the whalebone whale, a true mammal but living entirely in the water. In the beginning he had a full complement of teeth for masticating grass and weeds. He now lives upon the crustacea and other small denizens of the sea and has completely lost his teeth. Instead there have developed immense plates of whalebone running transversely across his mouth sometimes twelve to fifteen feet long. These are so arranged that when not in use they lie close to the roof of his mouth. The lower edge of the whalebone forms a fringe-like border. The animal will take a mouthful of water and the whalebone will drop down when the water is forced from his mouth, but the whalebone catches the small crustaceans, when they are swallowed. He attains a length of from forty to eighty or one hundred feet and weighs many tons, but his esophagus is no larger than one's arm, yet amply sufficient in size for swallowing the small crustacea. This is a fine example of adaptation to new surroundings when the life and continuation of a species depend upon it.

An animal with whom we are all familiar is the horse. He originated in North America and was about as large as an ordinary dog weighing perhaps twenty to thirty pounds. He ranged from Panama over the greater part of North America. His teeth were the usual kind for the cropping of grass and he had five toes on each foot. Through hundreds of thousands of years he grew in size but gradually lost his toes. These were reduced to four, then to three, to two and one as we know him today, and he weighed 600 or 700 pounds. He had migrated across Behring Strait and was

common in Europe and known to man of the old Stone Age. But in Europe they seemed to have separated into two distinct groups, one living in the forest, the other on the plains and, influenced by their environment, became widely separated in their habits. To those remaining in America disaster came. Through a contagious disease or some other calamity they completely disappeared. The isthmus across Behring Strait had probably sunk so that it was impossible for them to return and where there had been millions now there were none. The horses that were in the possession of the Indians and Mexicans when this western country was first explored were the descendants of those brought over by Cortez and his followers following the conquest of Mexico. The teeth of the horse, keeping pace with his development, have become one of the finest masticating apparatuses among all the animals, in some respects in its efficiency similar to the elephant. It is interesting to know that the horse is cousin to the tapir and rhinoceros.

The wild boar originated in Asia or Africa and shows special development of the cuspid teeth both above and below. The lower tusk grows straight up, the upper grows down then turns at nearly right angle, growing up and making a hook and a very effective weapon with which he can disembowel a horse or kill a man. He has been domesticated for several hundred years and his tusks have degenerated into short teeth an inch or so in length.

A rather curious but interesting thing has occurred in the southern States. On account of the favorable climate hogs were allowed to run at large. This was especially so when the South was first settled. Some of them strayed and never returned so that now there are a considerable number of these wild hogs running through the swamps and cane brakes. They are bony, long-legged, gaunt animals similar to their wild ancestors. The strange thing about this is that in these few years their tusks have returned to nearly their original size and the bristles on the back are much more



numerous and stiffer than in the domestic state. This shows how quickly a reversion to original conditions can be accomplished with a change in environment.

Contemporary with the animals I have mentioned above there was given off from the main mammalian tree another branch—the primates. This branch includes the gorilla, orang-outang, gibbon, chimpanzee, ape, monkey and man. This species, man, starting with no more intellectuality than his first cousins, the apes, was destined with the development of his frontal lobes to become ruler of the universe. In the beginning purely carnivorous, fighting with the sabre-tooth tiger, cave bear, lion, great wolf and other equally ferocious beasts, killing and eating those he slew and being killed and eaten in turn. But after thousands of years there developed a trace of intelligence, the invention of a spear and, long after, the bow and arrow and the ability to tie a knot gave him supremacy over the entire world.

It would require a paper longer than this just to trace a few of the important points in the evolution of the human race. It originated in Asia and migrated westward into Europe spreading over what is now France, Germany, Austria, Spain, the northern part of Italy and into England. The remains of parts of seventeen skeletons have been found ranging in age from 25,000 to 500,000 years. There have been six or seven different races that have lived, flourished and completely disappeared.

In the island of Java a portion of a lower jaw, three teeth and part of a thigh bone were found under rock, clay and gravel at a depth of more than thirty feet. The skull was restored and named the *pithecanthropus* skull. Near Heidelberg workmen excavating a gravel bed found a bit of lower jaw and teeth. This was restored and named the Heidelberg skull. It was found under seventy-

two feet of rock, clay and gravel that was once the bed of a river. The geologists came and estimated the length of time it had lain there and found it to be 500,000 years. Other specimens have been found in Spain, Austria, France and England, besides Java and Germany which have been mentioned.

When today we see the shortening of the mandible and maxillæ, the gradual elimination of the third molars, the fusing of teeth, the appearance of supernumerary teeth, it is for us to know that these things have not come by chance but are results of laws that are as old as life itself; that these examples are proof of a reversion through the law of heredity to conditions that existed thousands and perhaps millions of years ago, and the results of these investigations and explanations which have been made are but the first volume in the history of the human race. It is believed that the unexplored fields of Asia will eventually produce material for writing volumes two and three, in which all the links will have been forged and connected in this chain which represents the evolution of man. And through the study of that evolution must necessarily come a study of life itself, which through all the ages has been considered the mystery of mysteries, but which will become plain and simple, governed by the immutable laws of chemistry, physics and physiology.

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CALIFORNIA BLDG.

# Why Do Root-canal Fillings Fail and Place Us Open to Criticism?

By E. P. BRADY, D.D.S., St. Louis, Mo.

(Read before the annual meeting of the Pennsylvania State Dental Society, Reading, Pa., April 27-29, 1920.)

IN the past the dentist was in the habit of filling root canals just as a routine without any pecuniary reward to himself, and the less time spent upon them the better off he was financially. If we could only reach the entire profession and stimulate them in their endeavors along the line of root-canal work, I am sure we would not see such poor work in this field of dentistry, and at the same time there would be less criticism of operations of this nature.

We are basing our judgment on radiographic findings, and I have proved to my own satisfaction that we can have root canals filled to the apex and still not show with the X-ray. These teeth would be condemned on this evidence alone, so we must be more careful how our root-canal fillings show up in the radiogram.

Pathogenic organisms are always present upon the skin and the mucous membranes of the body in numbers beyond calculation. Why do they allow us to live? *Resistance—Immunity—Survival of the Fittest.*

Do not the periapical tissues possess any resistance to the injuries caused by the organisms—trauma or chemical insult! We know that one of the first signs of repair in soft structures—and the process in bone is modified due to its density—is the formation of capillary loops and connective-tissue stroma (fibroblasts) about the site of injury. In a granuloma there is a connective-tissue stroma which is attempting to hold the infection in check. I am firmly con-

vinced that if this tissue be freed from irritating effects of the infection the tissue would continue to repair injured or lost parts. We know this may and does happen as we have all seen cases of this type.

Let us continue to observe and record such cases, it will require an immense amount of detail, but each member of the profession should consider himself a committee of one to investigate this problem which is of such vital interest to the profession.

I wish to call your attention to the report made by Dr. A. D. Black that five per cent. of completely filled root canals later produced trouble; no data were given as to the condition of these teeth when filled, and he further remarked that this percentage could be materially reduced if the proper methods of root-canal work were used.

*When you extract a tooth just because it is devital you are condemning that member of the human body to destruction without sufficient cause!*

## CLASSIFICATION OF ROOT CANALS.

I have made a very simple classification of root-canal conditions into two general classes, (1) Anatomical, and (2) Pathological, and find it serviceable in explaining the cases and also for charting.

### *Anatomical Classification.*

Class A. Large Canals: Diameter greater than 12/1000 in. Larger than a No. 6 Kerr root-canal file.



Class B. Accessible Canals: Taking from a No. 1 to 6 root-canal file. Diameter 5.5/1000 to 12/1000 in.

Class C. Inaccessible Canals: Those finer than a No. 1 file.

### *Pathological Classification.*

Class 1. Non-infected canals.

Class 2. Infected, without periapical involvement.

Class 3. Infected, with acute periapical involvement.

Class 4. Infected, with chronic periapical involvement. Rarefied area discernible with the X-ray.

A tooth marked A,1 signifies a large canal without infection. By these symbols it is very easy to tell the condition of a tooth from your chart.

### **PATHOLOGY AND PROGNOSIS ACCORDING TO CLASSIFICATION.**

Class A,1—*Large Canals, Non-infected.* In this class our chief difficulty is in limiting our root-canal filling so that we do not overfill. A radiogram, as in all root-canal work, is imperative. Diagnostic wires for taking the measure of the canals will be a great aid in determining the length of cone to be used and prevent overfilling. The advantage possessed by these canals is their ready accessibility; but we have to be extremely cautious to avoid infecting these canals. I want to call your attention to canals of this description, as we know they are as a rule met with in younger individuals. Notice also that these teeth will invariably show a shadow with the X-ray, the same as a developing tooth shows a shadow when the apex is not fully formed, therefore we should be careful not to confuse these with rarefied areas of infection.

Class A,2—*Large Canals, Infected, without Periapical Involvement.* It is extremely difficult to limit infection in these cases and the prognosis is not as favorable as in the preceding class. I have worked upon teeth of this description and required patients to report back at three-month intervals, and I have

found that the prognosis is dependent upon the depth of the putrescent condition in the canals; a circumscribed putrescent pulp gave better results than a diffuse putrescent condition. These teeth are rich in organic material with large tubuli and the infection may readily penetrate deeply into the tooth substance. Another drawback is the fact that our agents used to sterilize the infected area may permanently injure the periapical tissue, leaving it in a condition of lessened resistance.

Class A,3—*Large Canals, Infected, with Acute Periapical Involvement.* The prognosis is rather unfavorable and I would advise extraction, especially when there is a complication with systemic conditions; in any case these teeth are bad risks. I have treated and filled some of them with good results, but as a rule I would rather consider this class very doubtful.

We are tempted to try our hardest with teeth of this description because most of the patients are young individuals, some of them making their first appearance in a dental office. For orthodontic reasons, as well as also for the impression this first visit to the dentist will make upon the young patient we often do our very best to try and save teeth of this description, and it is with some hesitation that I pass an unfavorable judgment on some. If you attempt to save such teeth it must be with the understanding that the case may be inspected over a period of a year. Saving one of these teeth, even for a year in some cases, is a great factor in preventing the production of a case of malocclusion, and I believe we are justified under these conditions in taking a chance.

As a question of diagnosis it must be remembered that these teeth do not show rarefaction with the X-rays and we must base our diagnosis upon local symptoms, *i.e.*, elongation, soreness on percussion, discoloration and a past history indicating putrescence; thermal test and also with the aid of the pulp tester.

Class A,4—*Large Canals, Infected, with Teeth Showing Rarefied Areas.* I



have had better success with this class than with any other due to the drainage facilities and also the ready penetration of the medicinal agents used in treating such cases. I do not advise saving all teeth so affected and I am following the practice of closely observing these at frequent intervals of time when for some special reason the teeth should be saved. It is better in most cases to consider the prognosis as very unfavorable in teeth of this class.

Class B,<sub>1</sub>—*Accessible Canals without Infection.* These are the teeth in which I feel we are doing an injustice to our patients by extracting. They will respond to root-canal filling and I do not consider that they are at all likely to cause future trouble. The readiness of accessibility enables almost anyone to fill them, and finally it is not necessary to do extensive reaming or to use chemical agents in order to open up the canals—all are strong arguments in favor of filling these canals.

Class B,<sub>2</sub>—*Accessible Canals Infected.* Prognosis is not quite so good as in the previous class, but as a rule these cases respond readily to treatment. There is some danger, however, and every precaution should be used to prevent the forcing of infection through the apex and involving this tissue. One reason for failure is the fact that in some cases the infection has penetrated through the apex and we have no means of ascertaining just to what extent this position is affected. We are more likely to suspect from the symptoms elicited from the patient that the periapical region is infected before the organisms have reached them, due to an acute pericementitis, although the infection has not actually reached this area.

The cause of failure may be attributed either to lack of proper methods of sterilization, or, second, to the forcing of infectious material through the apex by the operator.

Class B,<sub>3</sub>—*Accessible Canals with Chronic Periapical Involvement.* In general the prognosis is unfavorable and when complicated with general symptoms the teeth should always be ex-

tracted. Without general symptoms I have attempted to treat some of these cases and there is a possibility of clearing up the rarefied area. How this area will react in the future I do not know because I have not had the opportunity to observe them over a sufficient length of time. Prognosis is very bad.

Class C,<sub>1</sub>—*Inaccessible Canals without Infection.* I have had varying results with these teeth. Some in which great pains have been taken to reach out with the use of acids but with poor results, in fact these are the canals in which I have expended the most amount of labor. On the other hand I have seen some in which blind efforts, leaving the greater part of the canal unfilled, have been very successful. I have examined a great many radiograms which also show the same results. My conclusion is that the use of acids and kalium-natrium alloy with excessive filing with root-canal files is detrimental to the future welfare of these teeth.

Class C,<sub>2</sub>, 3, 4. I consider these cases hopeless and the teeth should be extracted. Teeth of these classes are exceedingly difficult to deal with and in most cases I have had failure. This is due to the lack of drainage and also the difficulty of properly filling the canals.

#### FILLING ROOT CANALS.

The first consideration should be to operate with the same precautions as a surgeon operates, that is, we must prevent a break in the chain of sterility. The operative field should be well cleansed with alcohol and the rubber dam applied. Do not consider the application of the rubber dam a loss of time, for you cannot expect to save any of these teeth if the rubber dam is not in position. I have read of the cases reported in the DENTAL COSMOS, of patients swallowing root-canal files or reamers. How could this occur if the rubber dam was in position?

The sterilizer I am using is the Pentz sterilizer and at the chair a Flaherty molten-metal sterilizer.

Johnson & Johnson paper points are very serviceable for cleaning out canals

and also in the application of medicaments. Before using I plunge them into the molten-metal sterilizer, the point on removal will be toughened and slightly browned, showing the effects of the heat.

Gutta-percha cones are kept in a Mynol dish, the center compartment containing paraform. If the cover is replaced after each removal of a point I feel that the surface action of the liberated formaldehyd is all that is necessary. Another precaution is the disinfection of the cavity. The method that I have found most satisfactory for this purpose is a three per cent. solution of iodine applied on cotton until the cavity is flooded, after which the hot air blast is used. I have heard some objection raised to this procedure, namely, that discoloration would result. In my hands I find when the decay is removed no discoloration remains. The purpose accomplished by this iodine method is two-fold—a thorough fixation of the organisms, and complete desiccation of the dentin. By fixing the organisms we prevent infecting the canals and the deeper portions of the tooth during the mechanical operations.

I consider the next step in the operation ranking as an important one and one that is often neglected. You must have access to a root canal before it can be filled, it is imperative that tooth structure be sacrificed for the cause. A very good method is to finish the preparation of the tooth for root-canal work with a mounted gem or carborundum stone of the cylindrical shape, the same as is used for marginal trimming. These can be obtained either in the straight or right-angle shank. After using them it will be found that all awkward angles will be removed and a ready access is obtained to the canals. We accomplish two very important purposes in this way: the broaches will not have to be bent at an awkward angle, thus preventing the breaking of the broach and, second, working in the canals is greatly facilitated.

In infected cases or in suspected infected cases our first endeavor after gaining access is to thoroughly dry the con-

tents of the pulp chamber and as much of the organic contents of the canal as possible, by a flooding process followed by hot air, with acetone or alcohol. Some operators use chloroform; any of these may be used.

Remember it is not permissible to use a broach at this stage of the operation. What do we accomplish by this procedure? By loss of water from this material we prevent, by direct pressure, the forcing of infected liquids through the apex. Another purpose accomplished is that the organic material is converted into a condition similar to that of a sponge and our medicinal agents are taken up more readily and penetrate more deeply in a shorter period of time. Our ideal would be to completely remove the moisture, but of course this cannot be accomplished.

#### DISINFECTING THE CANAL.

As an antiseptic I prefer dichloramin, using it mixed to a stiff paste with glycerin. Some object to the glycerin on the assumption that substitution of the hydrogen of the glycerin by the chlorine will cause a diminution in the amount of chlorine present. I find that by making this mixture fresh for each treatment, and it only takes a few moments, the above assumption does not hold true. The dressings still smell strongly of chlorine after remaining in the tooth for three days.

My theory is that glycerin is a very hygroscopic liquid and will absorb infected liquids in the canal without having to place it very deep in the structures. We know that glycerin, because of its great affinity for moisture, will even absorb water through a cork in a bottle. This process has a tendency to limit the action of the antiseptic to the area to which it is applied. However this is only partially true in the case of chlorine as it may assume the gaseous condition, although it is present in this compound as a  $\text{NCl}$  grouping, and then penetrate deeply into the structures. I am also of the opinion that if we use chlorinated oils as menstrua we are in-



roducing a substance which is extremely difficult to remove, and an oil will interfere with the firm adhesion of our root-canal filling to the tooth substance.

I do not find any objection to the use of tricresol and formalin in Class 3 cases and cannot see why with precaution they may not be used, although I have had just as good success with the treatment outlined. The question is often asked, Is it a good procedure to use tricresol and formalin? and the above is my answer to this question.

So much has been written upon the subject of the removal of the pulp and the reaming of the canals that I will not touch upon the first subject and only make a few recommendations on the second.

If a Kerr root-canal file No. 1 followed by a No. 2 is used the canals will be reamed just sufficiently to receive a Mynol gutta-percha cone, style A, extra fine. I find that this variety of gutta-percha point gives me the best root-canal filling. They are uniform in taper, possess sufficient rigidity and at the same time are the most convenient to insert. Most of the other points have no uniformity of length or taper. Because of this uniformity I always know that when the canal is reamed with a No. 2 file, the gutta-percha point will pass into the canal without interference, and this is certainly a great saver of time. I have had the experience with other root-canal points of being compelled to make several selections and then have to guess as to the results. I believe this method of having the root-canal point a trifle smaller than the reamed root, and also the point of sufficient length to be readily introduced through the entire length of the canal is a great aid in the filling of root canals.

The suggestion has been made to use a small, fine cone to fill the apical third first, and then introduce another cone to take care of the remainder of the canal. I find I have no control over the cone and the result is either failure to fill the apical third or the cone is pushed a great way through the apex. With a style A, Mynol cone there is sufficient

length and with digital dexterity we know if the cone is buckling or is following the canal as it should. A mark may be made on the cone as a guide, or by grasping it in the pliers at the correct length as determined by the diagnostic wire, we are able to judge better the distance to which the long cone is to be inserted.

#### ROOT-CANAL FILLING MATERIALS.

The filling of root canals presents certain difficulties and suggests a few questions. Will this operation be a success if we can hermetically fill the root canal, providing the periapical tissue is normal? Judging from Dr. Black's figures and also from cases under observation for two years and from other cases of longer standing filled by other operators, I am sure we have success.

Have we a root-canal filling that will absolutely seal a root canal? This question is subject to debate. There is much need for improvement in our root-canal filling materials, but for practical purposes I believe we are justified in using the methods that are in vogue at the present time.

A root-canal filling material that depends upon the evaporation of a solvent to my mind is based upon a false principle. Will a liquid evaporate from a stoppered bottle? Anyone will answer, No. Then how can we expect to obtain a homogeneous substance in a canal when we depend upon a liquid to evaporate? I am speaking of chloro-percha, eucapercha, chloroform and rosin, etc. Even if we do use a cone and take up the excess of the solvent there is still some of this material in the root canals. These substances depend upon the assumption that the root canal is dry. I know that this ideal is never accomplished. Acetone as a solvent approaches nearest to our requirements and it is compatible with water, but an objection to its use is that it does not soften gutta-percha. If we could find a material that would harden through a different process, *i.e.*, a process of setting, I believe it would come nearer to our ideal.

I have been experimenting with such



a substance and so far I am well satisfied with the results. The Dispensatory states that a mixture of Canada balsam with twenty per cent. by weight of magnesium oxid possesses the property of setting. Working with a modified mixture of these two I find that it sets, and more quickly in the presence of a small amount of moisture. I do not claim that these experiments are finished but I want to suggest that you try this mixture. I find a special advantage of this material is that it can be forced into extremely fine canals and will thus obviate the use of acids or kalium-natrium alloy and also excessive reaming. This material possesses all of the advantages of chloroform and rosin or other rosin solutions. It is sticky and can be so prepared as to produce a superficial softening of the gutta-percha, just enough to insure complete union. I shall give the formula later.

Root-canal filling to my mind has ceased to be simply a mechanical operation. We should also be able to act upon the contents of the tubuli and other organic material left in the canal and render them inert. How many times do we completely remove the odontoblastic layer when we remove a pulp? I am inclined to believe that it is rarely or ever accomplished. The permanent sterilization of this portion of a tooth by the ordinary use of antiseptics is rarely accomplished, as has been proven by Dr. Hermann Prinz.

We need some agent that will fix this organic tissue in the same manner as the histologist fixes tissue for the microscope. I have tried various methods to accomplish this, amongst them gold chlorid solution followed by hydrogen peroxid to reduce the gold. I have also tried ammoniated silver nitrate and formaldehyd as a reducing solution. In this later process the organic material is deeply impregnated by the silver which is reduced to the metallic condition with formaldehyd as suggested by Dr. Percy Howe.

I next tried ammoniated silver nitrate, followed with a one per cent. solution of nitric acid, the object being to have

a deep penetration of the silver salt; the nitric acid neutralizing the ammonia and both silver nitrate and nitric acid acting as a fixative; the silver acting upon the chlorin of the protoplasm and the nitric acid on the phenol grouping producing picric acid. Other reducing agents were then used for the ammoniated silver nitrate including tannic acid, creosote, eugenol; in fact a great many substances containing the OH or aldehyd grouping. Base metals were used also but they were considered unsuited for this purpose.

#### ANTISEPTIC VALUE OF SILVER PREPARATIONS.

In testing the efficiency of precipitated silver as to the antiseptic properties I want first to call to your attention theories involved and then describe some experiments.

It is a known fact that silver coins are remarkably free from infectious organisms. Silver combinations are known to be antiseptic in their properties. If a silver coin be placed in an infected culture medium there will be a zone immediately surrounding the silver showing no growths. There have been several theories advanced as to why this occurs: First, there may be a process analogous to a negative chemotaxis, second, which is the most probable to my mind, there always is a surface tension between the silver particles attempting to pass into solution and the water forcing them out of solution. This is according to the following chemico-physical law: A solid is soluble in a liquid when it can force into the liquid more particles than the liquid can repel. Still in the case of silver it is explained that for brief intervals of time some of the particles do pass into this zone free from growths. Then if we can throw the silver down in a finely divided state it will have a greater surface exposed to the liquids and in this way act more efficiently as an antiseptic. However, I consider that this antiseptic action is secondary to the more important fact that this organic tissue being penetrated

by the silver is so thoroughly changed that it no longer serves as a suitable pabulum for the growth of organisms.

Quoting from the results of experiments made by Dr. W. A. Chamberlain, St. Louis:

It is possible to have a seepage from the periapical tissue into root canals and also micro-organisms can pass from this tissue into the tooth. In teeth treated with ammoniated silver when tissue is left in the apical third region there was no seepage of liquids into canals. With teeth treated with silver nitrate and the pulp removed no growth appeared, showing that although liquids could pass back into a canal, still a growth did not appear.

All of the above teeth were vital when extracted and every precaution was taken to make the laboratory test similar to conditions at the chair.

A test was then made to show the germicidal powers of silver. A blotting paper was saturated with ammoniated silver, the silver reduced, the paper thoroughly washed and placed in an agar plate, and inoculated with *Staphylococcus citreus*. At the opposite side of the plate a ten-cent piece was placed and the plate was then incubated for twenty-four hours. There was a clear zone around the coin and a much larger one around the paper. This shows that the precipitated silver in this experiment does possess a germicidal property.

The insides of six test tubes of different diameters were coated with the white of an egg and allowed to dry. The diameters were 4, 6, 8, 10, 12, and 16 mm. When the albumin was entirely dry these tubes were mirrored about half-way up the tube by rinsing the tubes several times with ammoniated silver nitrate and applying a reducing solution.

This deposit was allowed to dry, after the tubes were washed with sterile water. Beef broth was inoculated with *Staphylococcus citreus*, which was then put in the tubes as high as the mirroring extended. Some of this inoculated beef broth was put in two sterile test tubes as controls. All the tubes were incubated for twenty-four hours.

After twenty-four hours the test tubes of agar were inoculated with the beef broth that had been in the mirrored tubes. Agar was also inoculated from the control tubes. The contents of all eight tubes was incubated for twenty-four hours. After twenty-four hours the controls showed growth while there was

no growth result from the inoculation of the broth with material from the mirrored tubes. *This showed that the diameter of the canal has no influence upon the germicidal effect of silver in root canals.*

#### ROOT-CANAL TECHNIQUE.

The following is the technique that I use in filling canals: When the canal is reamed and ready to fill, apply the silver solution. Place a gutta-percha cone in the canal, then with a dropper place a few drops of silver solution on the cone, and with a slight motion displace the air from the canal. *Under no condition pump the silver solution into the canal; this is not necessary and will result in a severe pericementitis.* Allow the silver to remain for about three minutes, then dry with the hot-air blast and apply reducing solution in the same manner as the silver. If for some reason you do not wish to fill the canal at this sitting seal in the tooth a J. & J. paper point moistened with the reducing solution.

After the silver has been reduced, dry the canal thoroughly with acetone and then fill.

A small drop of Canada balsam is placed upon a sterile glass slab, and in this incorporate some of the powder the formula of which is:

Magnesium oxid,	gr. 60
Bismuth oxid (yellow),	gr. 20
Zinc oxid,	gr. 20
Iodoform (heavy),	gr. 20

The iodoform may be omitted if desired; my reason for using it is its radio-opacity.

Allow me to digress from my subject at this point to emphasize the importance of opacity of the root-canal filling when radiographed.

Last summer in experimenting with extracted teeth I found that the root canals could be filled and the filling not show in the X-ray film. I then began a series of tests using teeth with constricted canals.

Canals filled according to Callahan's method did not show in the X-ray; gutta-percha solution in chloroform also

gave negative results; neither did I get results with euca-percha. In these tests the teeth were filled, then radiographed, and then decalcified. The radiogram showed the filling as far as the cone penetrated but did not show where the solution of gutta-percha had filled the canal. I next used Canada balsam with a mixture of various substances which had high atomic weights and this gave me an ideal result. The mixture consisted of uranium acetate, red lead, bismuth trioxid, bismuth subgallate, zinc oxid and iodoform. In root canals filled with the mixture the results were ideal. I next began a process of elimination to see if I could not simplify the mixture:

*Uranium acetate* gave splendid results, but I preferred not to use it.

*Red lead* gave as good results, but I also had objections to its use.

*Bismuth subgallate* did not show in the least.

*Bismuth trioxid* gave only fair results.

*Iodoform* gave results equal to the oxid of bismuth. However, a mixture of these two gave a result equal to uranium or lead and I have come to the conclusion that these two are the substances to use.

*Zinc oxid*, the material which we rely upon in gutta-percha to produce radiopacity, gave very poor results, and this is the reason why our solutions of gutta-percha do not show as they should.

We place some of this mixture, which

has been prepared the same as one would make a stiff mix of cement, into the canal on a broach. If it is too thick to force home, I have made it a practice to moisten a broach with a mixture of acetone and xylol, equal parts, to thin out the mix. The acetone and xylol in these proportions will soften gutta-percha and during the pumping of the gutta-percha cone in the canals will take up this small amount of the solvent.

The next step is to select a medium-size Mynol cone and with it work this mixture into the canals the same as we would use Callahan's method, then use a style A, Mynol gutta-percha cone and force into position, packing it with a S. S. White root-canal pick No. 2 (flexible), then finish the pulp chamber in the customary manner. I use a piece of base plate gutta-percha.

If you do not wish to use the Canada balsam then I would advise adding bismuth oxid to the chloroform and rosin solution; this works very nicely. I also advocate the use of iodoform, but its odor is an objection to its use.

In conclusion I wish to say that this subject is such a large one that I know there are some very important points which I have failed to bring out, but if time will permit I should like to show you some specimens and at the same time explain the technique which I have advocated.

5238A MINERVA AVE.



## Management of a Dental Practice:

Being the Report of the Committee on Practice—Dental Society of the State of New York.

By DAVID W. McLEAN, D.D.S., Mt. Vernon, N. Y.

(Read before the Dental Society of the State of New York, at its annual meeting, Albany, May 13-15, 1920.)

WITH your kind indulgence, the Practice Committee's report will this year break away from long-established precedent. Instead of reviewing the various operative procedures in the various departments of our professional activities, and commenting upon any changes or tendencies which might be detected, your committee wishes to direct your attention for a few moments to a study of what constitutes efficiency in the *management* of a dental practice. And it is the earnest hope of the committee that some points may be brought out either in the paper or in the discussion which follows it, which may be of benefit, and which in particular may help to set some of the younger men on the right track.

It is lamentable that our colleges do not include in their curricula lectures of practical character and worth-while scope, on the subject of Dental Ethics and Economics. Dentistry is one of the most underpaid professions in the world today—and the reason is not far to seek. Dentists and physicians are known throughout the land as "easy marks"—and again the reason is not far to seek.

The average dentist goes from grammar school to high school, from high school to college, and from college into practice, without any business experience whatsoever. His business ability is that of a school boy, and such it remains, for shut up in his own office to work out his own salvation, he must either raise himself by his own bootstraps or learn

slowly and laboriously from that unsympathetic teacher, Experience,—and sometimes at several hundred dollars a lesson.

The average dentist goes into practice without any knowledge of how to treat other dentists with whom he comes in contact through his patients, or how to treat any patient other than the infirm patient.

Many a dentist who has achieved skill as a diagnostician and operator struggles along year after year, and never "arrives"; because he has no conception of how to impress patients favorably, how to order his office and its system, how to gage his fees, how to collect them, and how to save them.

The man who makes an invention must know how to produce the article and sell it, or he will die poor in spite of his inventive skill. The man who buys a farm must know how to plant it, to harvest its crops and to sell them—or the farm benefits him little. And the man who walks out of dental college with a diploma under his arm has simply acquired the commodity he is to give the public in exchange for a living for himself and his future dependents. If he does not know how to *use* it to that end, of what value will it be to him?

Now that the college course of study has been lengthened to four years there is no reason why the colleges should not do their full duty and teach their students how to use the technical knowledge and skill they give them. The colleges of this country in this way can put the

practice of dentistry on a new plane in ten years!

Both in the past, and in preparing this report, your chairman has corresponded and talked with a number of men who conduct large practices in various parts of the country. He has visited the offices of a number of them, studied their methods, their surroundings and their business systems, and has become firmly convinced that the successful practitioner is never an accident. Success comes as a result of infinite thought and study. Young or old, one-man practice or "group" practice, east or west, every successful practice is built upon a basis of definite business principle. An interesting fact is that the successful men reach, each for himself, practically the same conclusions as to the requisites for the up-building of a practice.

The first requisite is that a man must "deliver the goods." In this discussion that is the point from which we start—and we can not even *start* without it. There is no substitute for delivering the goods. There is no substitute for that steady glance and air of quiet confidence which goes with the knowledge that you can and *do* deliver the goods. The operation must be a little shorter and easier for the patient, and the outcome more perfect than the other fellows are achieving, and when something goes wrong, the operator must stand squarely back of his work, and make good. The patient's knowledge that the operation will be made as easy for him as possible, and that the operator will stand back of his work, is the greatest asset the dentist can have. Success rests on demand; when demand exceeds supply, when two hands can no longer perform all the operations the public demands, then fees advance in dentistry as in anything else under the sun.

#### PERSONAL CARE OF THE DENTIST.

The next great factor is the man himself. A good-sized chapter could be written on the person and personality of the dentist. One of the greatest needs in our profession is that of more careful

self study, of greater care of our persons and our personalities.

The successful salesman dresses well and studies his manner of approaching and talking to his "prospect," and the dentist is a salesman; not that he sells fillings, crowns and bridges, far more than that, he sells *himself*. If he inspires trust and confidence in a patient, he has sold himself to that patient, and he can then perform any needed operations with practically never a discussion of fees.

A man cannot help his face, but he can keep it clean-shaven; he cannot help his nose, but he can remember that the patient sits looking up it; he cannot help the color of his hair, but he can keep it cut and brushed, and glossy from frequent washing rather than stringy and greasy. The patient has an hour to study every detail of his personal appearance, and as much of the room as she can see, indeed it is about the only occupation she has. And, dear friend and brother, how can a patient have liking for or confidence in a man who needs a haircut, has blinkers in his eyes, an unclean nose, stubble on his chin, a cracked, soiled collar, a frowsy fifty-cent necktie worn out of all shape, a white coat raveling at the edges and soft and sleazy and soiled, who has hands that are grimy and nails that are untrimmed?

"Oh," thinks the patient, "what a mussy man." And if she has average intelligence her next thought is "How can anyone so patently careless be other than careless about his work?"

My advice to the young man, and to a great many older ones, would be: Try to see yourself and your surroundings with the eyes of the most fastidious patient. Try to become as fussy and fastidious as you can, yourself. The patient does not know dentistry, but he does know men, and he will judge the kind of operation you are apt to perform by yourself and your surroundings.

As to personality. It is true that some of us are naturally sunny and some of us are grouches. But while we cannot change our natures, we can "doll them up" considerably. As we study patients



we realize that some are quicker to antagonize than others, some naturally rub *us* the wrong way, and if we are not careful, *we* will rub some of *them* the wrong way. Most people like a cheerful, optimistic person, and without being effusive or gossipy, the student of patient psychology manages to infuse into his manner each hour of the day a sufficient degree of cheerfulness, optimism and enthusiasm, and to strike a note of sympathy with the patient.

Avoid talking politics or religion or broaching antagonistic subjects, and if you do not agree with the patient, let *him* do the small amount of talking which time permits. He will go away impressed with the fact that you are a mighty likable chap and very entertaining. You are not in the office to teach the patient anything but the care of the teeth; you are there to perform dental operations with maximum skill and minimum friction and discomfort to the patient.

#### PERSONAL SERVICE.

The next factor is what business men call "personal service." Everyone on the office staff should be taught to study the patient's comfort, and the dentist must study it too. From the moment she enters until she leaves the patient must meet courtesy, tact, and a pleasant manner on the part of everyone in the office; she must be spared awkward moments of any description.

The "social secretary," whose duty it is to receive patients, conduct them into the various offices, etc., and arrange appointments both in person and over the telephone, should have a pleasing personality, and a friendly (but not over-friendly) manner. For the successful handling of telephone conversations, she should have a "voice with a smile." In face to face conversation, facial expression colors or tempers all we say; over the telephone there is no facial expression in evidence, and the choice of words and the inflections of the voice become all-important.

It should be her duty to secure necessary data from the patient, show the pa-

tient into the reception room, and point out to her the bell-button which connects with her own desk; to see that *recent* magazines are at hand, and to point out to the patient that the desk and telephone in the reception room are for patients' use. It is then her duty on the occasion of the patient's first visit to introduce her to such members of the staff as are to first take her in charge.

A thousand little odds and ends in this connection must be worked out in each individual practice; no one of them is all-important in itself, but their sum total constitutes service; and personal service is one of the most important points to develop in a dental practice. If large hotels find it worth while to spend a great deal of thought and money in developing personal service for their guests, how much more important is that element in a dental practice, which is the most personal sort of personal service throughout.

#### HANDLING PATIENTS.

Next in order comes gentleness. A man can not help it if he has a number ten hand, but he can cultivate a light touch. The patient is willing to stand necessary pain, but he naturally objects when he is pulled, and pawed and scratched and hurt carelessly and, as he knows, needlessly. Hold up your own hands and arms; do not rest half your weight on the patient's jaw.

Keep away from the patient. All women, and most men, dislike to be touched or leaned against by strangers. When assisting in the conducting of State Board examinations in practical operative dentistry, the writer has been dismayed by the "nose to nose" position adopted by many operators. Don't breathe the patient's breath, and don't make her breathe yours. If you must for a moment get into a position in which your breath might reach her face, *hold* your breath.

Keep instruments out of sight. The patient should never see the hypodermic, the lancet, the forceps or the elevator which is about to be used. The bark of



all these instruments is far worse than their bite; don't let them bark!

All this is very sketchy, but it should be suggestive to the man who has ears to hear, and eyes to see. To a gifted few, many of these traits are natural—fastidiousness, gentleness, a sweet disposition, likable personality, and that faculty of thoughtfulness and tact, which constitutes "personal service," but they can all be acquired and there are few of us indeed but have to cultivate one or more.

From an economic standpoint, the greatest factor in a dental practice is to avoid waste. One of the greatest wastes, and indeed one of the prime reasons that a great many dentists get nowhere financially, is that they give their time to patients who are never going to pay them.

In every community there is some facility for getting information as to the financial responsibility of prospective patients. None of the stores or business organizations of a community will extend credit without knowing something about the man to whom they extend it. Financial reports may be obtained through the local Chamber of Commerce, or the Business Men's Association, or through some credit agency. Reports on the financial responsibility of new patients should be obtained promptly.

Another great waste lies in the fact that many professional men think it undignified to press collection of delinquent accounts. Many professional men will stand any amount of loss rather than take a case into court. And a great many other men have ventured into court once, and their methods of keeping records and accounts have been so loose and undependable, that they have experienced a great deal of chagrin, and do not care to repeat the experience.

One of the greatest assets a dentist can have is to be known as a good business man. If for this reason only, he should render monthly statements, and he should follow up delinquent accounts until they are either paid, or absolutely proven uncollectable. "Birds of a feather flock together," and if a few people can "get by" without paying, they soon pass

the word to others of their ilk, and the unfortunate dentist will soon find himself tied up in a great many such cases.

The manager of one of the S. S. White Dental Manufacturing Company's branches once told the writer that he had put on his books four hundred thousand dollars' worth of business during the year, and that he could safely state that not one hundred dollars of it was "bad money." A moment's review of your own affairs will convince you that if you could collect on this basis for all the operations you perform, you would be financially on "easy street."

Another great waste of time lies in the fact that dentists continually perform operations for which they make no charge, such as trimming occlusions, grinding cusps and fissures, and polishing fillings other than their own; such again as root-canal dressing, dressing of wounds after extraction, and a host of other operations. Suppose you go into a store and buy three hundred dollars' worth of merchandise, and you are leaving the store with it in your pocket (where it will fit nicely nowadays), when you recall that you need a ten-cent lead pencil. Does the store keeper "throw it in" without charge? Why then should the dentist, who for fifty dollars is making a crown which perhaps represents more material and time and skill than does the three hundred dollars' worth of merchandise, "throw in" half a dozen other operations? It is not only poor business, but it is undignified.

#### ACCOUNTING METHODS.

Another vast wastage in the management of dental practices throughout the country lies in loose and faulty methods of accounting. There are comparatively few offices in which a really efficient system of accounting is in operation. There is in most cases no way of checking up whether an operation has been charged on the day-book, and also on the patient's account. There is no way of checking up the secretary's mathematics in balancing accounts unless it be by going over every item, and no dentist is going

to do that month after month; if he is, why have a secretary at all?

The writer has always used, as have probably most dentists, a "single entry" system of bookkeeping, and in conjunction with it has used a National Cash Register which does a great deal of the accounting automatically. Since embarking upon the investigation attendant upon the preparation of this report, he has discovered several weak spots in what he thought a very efficient system of accounting, and has become convinced that a "double entry" system is the one to employ. Most of the large and efficiently run practices use the double entry system because of the readiness with which errors show themselves.

Dr. Frederick L. Stanton of New York City was probably one of the pioneers in this direction. His system was installed by a firm of public accountants of New York City, and his books are gone over monthly by one of their experts and a detailed report is submitted to him. At the end of the year the annual report submitted by the accountant gives him all material necessary for his income tax report. Dr. Stanton has consented to show his forms and explain their use at one of the clinic sessions, and no one who is at all interested in the efficient management of a dental practice can afford to miss Dr. Stanton's clinic. Dr. H. W. Gillett uses a similar system and by it handles not only his office finances but also those of a good-sized tobacco plantation.

The waste of materials, gold filings, etc., which seems to be on every dentist's mind, sinks into insignificance beside the value of the time the average dentist wastes in mixing amalgam and cement, hunting for lost instruments, sterilizing and drying his own instruments, talking over the telephone, talking to agents, salesmen and anyone else who chooses to drop in on him, and in doing dozens of other things which someone else could do for him. The dentist, himself, is the great producing factor in a dental practice, and his motto should be "never do anything which someone else can do for

you." In other words his entire time should be spent in doing things which demand so much skill, or demand his personal touch to such an extent that no one else can do them for him.

Time which he spends in talking to patients over the telephone, in doing routine detail work, which a stenographer could do for him, making appointments, etc., is time wasted, and in some practices the sum total of wasted time in one year would buy the waster a very presentable automobile.

#### THE VALUE OF AN INTELLIGENT NURSE.

The operator should so plan his operations and his technique that every moment of his time at the chair is spent in actual operating. This means that he must have a well-trained operating nurse and in order that she may work with him intelligently, she must be able to tell what he is going to do next. The instruments must be grouped both in the cabinet and in the nurse's mind, according to their use. The cue is given to the nurse either direct or in some remark to the patient, and when she has learned the nature of the operation, she should be able to place the entire group of instruments for that operation in readiness. The operator must standardize his operations; in other words use his instruments and perform the various steps of the operation in definite and regular order. Then any intelligent nurse after watching him perform that operation a few times, will know what step and what instrument will come next.

Then the operator must keep mentally one step ahead of what he is actually doing, in order that the operating nurse may have what is needed for the next step in readiness. For instance, there is no object in having an operating nurse if the team work is going to be so poor that the mixing of amalgam, getting out of cement, slab, etc., is not commenced until the moment has come to use them. If the operator is going to stand and watch the nurse mix the amalgam, he might as well do it himself. In the



efficient dental office things should appear on the operating table ready for use the moment the operator is ready for them.

The operator should rarely, if ever, select an instrument from the cabinet himself; or change burs himself; or polishing disks. The use of two or three mandrels so that the operating nurse can set up one paper disk while a second one is in use will save enough of the operator's time to more than provide disks, mandrels, and stones for the entire practice. When a bur is placed in the handpiece, the operator should be able to say, for instance, before he commences using it, "medium inverted cone next," and the nurse will be ready to insert the new bur the moment he is ready for it. Three or four sizes of burs in each style are enough, and they may be named "large," "medium large," "medium" and "small." The same method is employed with burnishers and chisels. The secretary has the catalog numbers of all the instruments in the cabinet; a reserve set is kept in stock, and others ordered as needed.

The proper kind of assistance at the chair, together with the sterilizing of instruments, procuring of inlays and prosthetic cases from the laboratory, etc., will keep one person busy. Attendance upon the reception room, the door, the telephone and the desk should not be expected of an operating nurse, and it is safe to state that any busy office should have at least two young ladies whose chief object in life is to save time for the dentist himself, so that he can spend it in production.

One thing is certain and that is if there can be only one young lady assistant in the office, her time can be spent to greatest advantage assisting at the chair. Not only for this purpose should she be present, but also as a very important witness to all that takes place in the office. Many a man has been blackmailed, or has been successfully sued for malpractice, because he had no witness to testify in his behalf as to what took place in the office when the patient was present.

#### OFFICE MANAGEMENT.

Now, while much has been said about the dentist spending all of his time in production rather than wasting it in non-productive details, the fact remains that the dentist should not spend all of his time at the chair. He must spend a definite amount of time daily at his desk, studying efficiency, collections, watching the running of his office system, studying his cost of production, determining whether he is practicing at a loss or a profit; and also in replying to letters before they become yellow with age.

The average dentist spends too much time operating and not enough in managing and planning his practice. Probably not half the dentists present know definitely how much it costs them to produce one hour's work. How then can they know how much to charge for changing a dressing, which takes say fifteen minutes?

Every item of cost should be recorded, every expenditure, interest on investments should be added, taxes, interest on mortgage on office building, or interest on any office indebtedness, and indeed all overhead. The total for month or year should be divided by the total number of hours of actual operating, and the result will be what it costs you to produce one hour's work of any description.

A very important consideration closely allied to the subject is that of holding on to the small amount of surplus money which a dentist manages to eke out by dint of persistent application and overwork. And it may be stated here that the only way to save money is to decide what percentage of income you will save, then save it each month and live on what is left. If one waits for a *surplus* to "salt down" one will wait forever, particularly in these days.

#### INVESTMENTS.

The dentist should realize that even though he manages to conduct his dental practice efficiently, that is in most cases the only phase of business which he



knows anything about. Repeatedly one hears dentists and physicians remark that if they could only hold on to what they earned, they would be quite comfortably fixed; but that whenever they get a couple of thousand ahead, someone comes along with an investment promising fifteen or twenty per cent. and the prized two thousand is exchanged for a few pretty but worthless stock certificates. There is no safe investment paying such fanciful rates, and even if there were, the dentist who makes his own investments, is like a banker who fills his own teeth. The investing of money is just as much a specialty as is the filling of teeth.

At the present moment the safest investment in the world is easy to select, for there could be no investment safer or better than Liberty bonds selling at ninety, and paying four and one-quarter per cent. on par. If this does not appeal to you, do we beseech you, consult a disinterested expert. A dentist's surplus comes too hard to permit of taking any chances with it.

#### LIABILITY INSURANCE.

A second point in this connection is that every dentist should carry malpractice insurance, and not only malpractice insurance, but a *lot* of malpractice insurance. Else some adventurer learning that Dr. So-and-So owns his own home and a car may trump up a malpractice case against him and take them away.

A recent malpractice case tried in Westchester County points two lessons. First that no dentist is safe against malpractice suits. In the case mentioned, the patient called upon the dentist four years ago complaining of loss of weight, general debility, and pain at the back of head. A putrescent pulp was found, and was removed; the tooth was treated with formocresol, and after several treatments the root canals were filled, and the tooth crowned. The pain at the back of head continued; a physician discovered fluctuation, opened the scalp and established drainage. Septicemia set in and the patient died.

Two experts from New York testified in this connection that when formocresol is sealed hermetically in a tooth, the heat of the body liberates formaldehyd gas which passes out through the end of the root causing pressure sufficient to force infection and toxins into the tissues and circulation, later causing septicemia. When asked "Then the sealing of formocresol in a tooth would be a competent producing cause of septicemia?", one gentleman replied, "Absolutely." You see then that no one is safe however conscientious he may be in his treatment of cases. There has been a vast amount of loose talk about removing *all* non-vital teeth and all that sort of thing, and so-called expert opinion can be brought into court almost without limit. So no man who has saved a non-vital tooth during the last few years is safe, and especially if the above-mentioned case is allowed to stand as a precedent.

The second lesson pointed by this case is this: The dentist was insured for five thousand dollars, and the suit was for fifty thousand. Although the dentist's responsibility in the matter amounted to forty-five thousand dollars against the insurance company's five thousand, nevertheless under the terms of the policy the insurance company furnished and controlled the defense. The company selected a lawyer who seemed entirely at sea among the medical technicalities involved, and was unfortunately loath to take advice from his experts. Although he had five experts, he put only two on the stand, disregarded practically all the data they had provided for him, and when his experts were involved in cross-examination, owing to the fact that they were obliged to answer "yes" or "no" to questions, he failed to give them any re-direct examination to straighten out the points on which they made a poor impression. The plaintiff was awarded a verdict of twenty-five thousand dollars.\*

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\* I have just learned that through the organized efforts of the Ninth and Third District Dental Societies of this State, and the personal efforts of Dr. Tracy and Dr. Gillett

The group policy under which members of this society are insured provides that the entire policy of the defense is controlled by a committee of five, three appointed by the society, one by the company and one by the insured. But for any man insured outside of this policy plan, our advice is, carry *none* or carry a great deal.

If the case cited above is allowed to stand as a precedent, it will not be safe for the most conscientious dentist to own property in his own name. And it might be well to have a release form such as the one to be shown shortly on the screen, which patients may be required to sign when an infected or otherwise doubtful tooth is to be "saved."

Before turning to the lantern slides which will show views of several dental offices, and of forms from several large practices, your chairman wishes to express his appreciation of the courtesy shown him by Drs. E. S. Best of Minneapolis, A. B. Crane of Washington, D. C., H. W. Gillett, W. D. Tracy, F. L. Stanton, R. Ottolengui and T. P. Hyatt of New York City, A. C. Fones of Bridgeport, E. L. Bryant of New Haven, and C. E. Kells of New Orleans. All of these gentlemen have forwarded illustrations, floor plans, and business forms to your committee for reproduction on the screen, and it is our hope that we may all find them both of practical value, and a source of inspiration, to spur us on to greater success. For we are firm in our

the two experts have been led to see that they have expressed not the views of the vast majority of the profession, but of a radical few, and these two experts have signed a retraction which will throw this case back for a re-trial, and a very dangerous precedent is in a fair way of being removed.

belief that the vast majority of practitioners will perform better and better operations as they learn to make them financially worth while.

[Dr. McLean showed on the screen a number of slides illustrating the offices of the gentlemen mentioned and numerous business forms.]

#### SUCCESS.

And now, gentlemen, we have spoken much of "success," and owing to the nature of this discussion we have frankly used the word in a mercenary sense. But I know you have not been misled. Financial success is not of necessity real *success*. You and I know full well the bigger, broader significance of the word.

The man whose one aim is a large fee, a large income, a large bank account, is as wretched in dental practice as he is elsewhere. The man who will not take time to attend a dental meeting, or to prepare and read a paper *without being paid for it*, or give time to research or to teaching; the man whose life is one grand scramble for his own advancement is a pitiable spectacle. The man who cannot take time to keep his body healthy and his mind broad, and his disposition sweet, is a failure no matter how great his material success.

There have been men in this profession who have died in harness, yes and sometimes in rather shabby harness, but whose success was yet so great that we shall always see them in a blaze of light; men before whose memory you and I stand with bared heads and pray that we may be just a little more like them.

125 PROSPECT AVE.

[See also *Discussion*, as reported under "Proceedings of Societies," this issue.]



## Industrial Dental Dispensaries:

Being the Report of the Correspondent (1920), Dental Society of the State of New York.

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By ARTHUR W. SMITH, D.D.S., Rochester, N. Y.

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(Read at the fifty-second annual meeting of the Society, at Albany, N. Y., May 13-15, 1920.)

GR<sup>E</sup>AT problems are facing the field of industry today. Important changes in the relationship of capital and labor are occurring constantly, and no one seems to be able to even guess what the outcome may be. The problem of health is not the least of these. On the one hand, industrial concerns have been endeavoring to increase the efficiency of their employees through the conservation of health. On the other hand, legislative bodies, working presumably in the interest of the employee, have enacted or proposed numerous laws compelling the employer to adopt certain health measures.

It is not the intent of this report to laud or condemn either method, but to determine if possible what relation the dental profession through Industrial Dental Dispensaries bears to the problem.

Facts and opinions were obtained from four sources: dentists at large, dentists in charge of industrial dispensaries, concerns in which dispensaries are in operation, and concerns which do not now have dental dispensaries.

The questions sent out, as you will see, were constructed in a manner to be answered with a minimum exertion in order to avoid imposing additional labor on busy men. Consequently the results do not constitute an exhaustive study of this many-sided question. Replies were received, however, from nearly everyone addressed, so that the conclusions are fairly representative.

### QUESTIONS AND ANSWERS.

Taking first the practitioners at large the questions and answers were as follows:

QUESTION 1—*From the standpoint of the dental profession, do you consider that Industrial Dental Dispensaries are commendable?*

Twelve answered in the affirmative and one in the negative.

### Quotations.

Dr. Edwin H. Mauk: "Question is ambiguous. What standpoint do you mean? As a citizen considering the good of the community, Yes. As a dentist, believing in the almost universal need for dentistry and the value of any agency that gets dental service to the people, Yes. As a dentist struggling to establish a practice, there might be some ground for fear that a widespread establishment of industrial dentistry would undermine private practice. This should have no weight with the man who is established. There are not enough dentists, nor probably ever will be, to meet the need for dental service."

Dr. Paul R. Stillman: "Yes, when such Industrial Dental Dispensaries are conducted by the industry which they serve and not by the State."

QUESTION 2—*Do you believe that the installation and operation of such dispensaries should be generally encouraged?*

"Yes," answered by eleven. "No," answered by two.



*Quotations.*

Dr. Edward C. Kirk: "Yes. As a necessary corollary of my affirmative answer to No. 1. and for the further reason that it is good propaganda. Generally speaking when one employee has through personal experience learned the value of oral hygiene he converts two others or members of his family to the same belief, and thus increases the general demand for dental service."

Dr. Carl J. Grove: "No, not if operated as they are at present."

QUESTION 3 (A)—*Do you think it advisable to charge for services rendered?*

The answers were all in the affirmative.

*Quotations.*

Dr. Stillman: "Yes, by all means a fee should be paid for all services. No employee wishes to be a recipient of 'something for nothing.' A dental dispensary should not be a charity organization nor the dentist in charge become a pauper through a false notion of the value of his service."

Dr. Kirk: "Yes, because I am radically opposed to the principle, or more accurately the lack of principle which involves giving or getting something for nothing in any transaction or activity other than pure charity. Charity offered to those able and willing to render an adequate *quid pro quo* is an insult to their dignity, a menace to individual freedom, and its acceptance leads to parasitism. Therefore a proper fee should be charged."

(B)—*If so, on what basis—i.e., one fee for all kinds of service; graded fees depending upon nature of the work; time basis; etc.?*

*Quotations.*

Dr. George Wood Clapp: "Graded fees, time, nature of work, ability to pay, etc."

Dr. Arthur Zentler: "Varying and graded fees depending upon salaries of employees, nature of work, and time, the main ground for computation being based upon a proportionate division of the burden of the services rendered, to be borne at least fifty per cent. by the employer and fifty per cent. by the employee; preferably, however, a larger proportion by the employer and a lesser by the employee."

Dr. D. W. McLean: "Graded fees for various operations, based upon average time, but subject to variation in extreme cases."

Dr. Mauk: "Graded fees at a nominal self-sustaining rate, saving to employee to be calculated as an inducement for, and contingent upon employment with the institution or industry."

Dr. Stillman: "A budget should be made up by the company (with the advice of the dentist) which would support two-thirds of the overhead expenses of the dental plant, rent, salaries, materials, etc. Income should be derived from three sources: Capital should pay one-third; labor (viz, all who receive pay from the company whether receiving dental service or not) one-third; and one-third of the cost should be paid by the recipient of the dental service rendered. Fees could be rated upon the yearly income of the patient from the company. The fees should be graded on a time unit basis—one unit—fifteen minutes' time. The rate per unit each employee should pay would be based upon the amount of income earned each year by the patient. For instance, an employee earning \$2000 a year, \$1.00 per unit; \$1000 per year, \$0.50 a unit; \$500 per year, \$0.25 per unit, etc. The superintendent with \$10 000 should pay according to his income derived from the industry."

Dr. Kirk: "The benefits of industrial dentistry are mutually shared by both employee and employer. The employee secures physical comfort, freedom from a variety of infections that cause ill health and disease, and consequently the greater joy in life that results from physical well-being. The employer derives from the improved physical condition of his workers higher efficiency in service and improved morals."

"Such being the situation and relation as I see it, my belief is that employees should be required to pay a fee sufficient to cover the cost of materials employed, while the cost of rendering the professional service should be borne by the industrial organization."

"As an economic proposition I think it can readily be shown that the cost of installing and maintaining an industrial dental dispensary service is more than covered in the improved morale, the increased efficiency and decreased loss of time from physical disabilities of dental origin among its employees."

QUESTION 4—*As a general principle, would you consider it preferable to have (a) fewer dispensaries with men of recognized ability as operators or (b) a greater number with operators whose ability has not been established? (This*

*implies that the former can only be secured by offering salaries which would be prohibitive except in large concerns.)*

Five preferred the first proposition, four the second, and four a combination of the two.

*Quotations.*

Dr. F. R. Henshaw: "I feel that only expert men with the highest ideals are fit for such service."

Dr. Wm. G. Ebersole: "Will say that unless dispensaries are presided over by men of recognized ability they become an abomination instead of a benefit. The chief objection to dispensaries is that they either get under the control of politics or those installing them employ undesirable operators because they are 'cheap.'"

Dr. Kirk: "As a general principle only men of first-rate ability should be charged with industrial dental service on the principle that 'whatever is worth doing at all is worth doing well.' The phrase 'recognized ability' is a rather general term, everything depends upon who does the recognizing."

Dr. Stillman: "A greater number of operators of an unknown quality of attainments would be able to close the plant within a short time, due to death and infirmity of its employees from the character of their work. The pay of the dentist must be made as attractive in an industrial dental dispensary as it should be in any other kind of dental practice."

Dr. Zentler: "Aside from the fact that men of recognized ability would command salaries which would be prohibitive to the majority of concerns, it is preferable to have a greater number of dispensaries with operators of average ability, because of the principle of doing the most good for the most people."

Dr. Clapp: "Men with known ability for large concerns. Men with fair ability for small concerns."

QUESTION 5 (A)—*As a hypothetical question, would you consider abandoning your private practice and taking a position as operator or director of an industrial dispensary if the matter of salary were satisfactory?*

Four answered "Yes," and nine "No," some with reservations.

*Quotations.*

Dr. Henshaw: "Yes, if I were a younger man."

Dr. Stillman: "What is the proposition?"

Dr. McLean: "Yes, the only drawback is that after abandoning a good practice for two or three years, one might be 'fired' and left to start again at the bottom of the ladder."

(B)—*If not, why?*

*Quotations.*

Dr. Russell W. Bunting: "Personally, would not care to have so limited a field."

Dr. J. Wright Beach: "Salary basis limits progressive spirit, generally speaking. Could not secure commensurate salary for mature practitioner."

Dr. Clapp: "Because no concern could afford to remunerate me, and I like research better."

QUESTION 6—*Can you mention some obstacles which might stand in the way of the successful operation of such dispensaries?"*

*Quotations.*

Dr. Kirk: "Lack of co-operation due to appreciative understanding of the value and importance of the service upon the part of the industrial management or on the part of the body of employees; an erroneous policy or an undiplomatic presentation of a correct policy in the installation of the service; an unfair system of charges; introduction of the system upon a compulsory basis; the failure to make the service educational in the field of hygiene and to use the results as a demonstration of its value of those who avail themselves of it."

Dr. Zentler: "Poor organization, poor management, and inadequate compensation to operators."

Dr. Beach: "(1) Commercializing dentistry for benefit of employer (corporation, company, etc.); (2) control of fees by employer; (3) lack of supervision by profession; (4) lack of control of ethical standard of dentists so employed."

Dr. Stillman: "Lack would be the greatest obstacle; lack of anything which makes for success in dentistry anywhere."

Dr. Clapp: "Narrow-minded employers; dentists with narrow vision. A dentist for this work should be half-practitioner and half-educator."

Operators in industrial dental dispensaries provide the second source of information.



QUESTION 1—*How long has the dispensary in which you are employed been in operation?*

This question was asked to determine the experience obtained therein. The oldest (from which a reply was received) was that installed in the plant of the Armstrong Cork Co. in 1911, and the most recent in the plant of the National Cash Register Co. Seven of the thirteen concerns written to have had dispensaries in operation for more than five years.

QUESTION 2—*Do you do all classes of work?*

In one dispensary, that of the Armstrong Cork Co., practically every dental operation is done, including orthodontia and oral surgery. In five concerns nearly all operations are done. In five others only general operative dentistry and oral prophylaxis, and in two concerns the work is limited to prophylactic and pyorrhea treatments. (You will understand, of course, that this does not include all industrial dispensaries, of which there are more than four hundred in operation at the present time.)

QUESTION 3—*Is the prophylactic work systematized, i.e., are employees called periodically for treatment?*

Seven negatives and six affirmatives were received. The average recall period was from four to six months. At the Babson Statistical Organization, employees are called for prophylactic treatments once each month.

QUESTION 4 (A)—*Do you find that the patients fully appreciate the work done for them?*

(B)—*If not, what does their attitude seem to be?*

All but four answered "Yes" without qualifications.

#### Quotations.

Dr. Smith of the H. J. Heinz Co.: "Yes, but many do not seek the office who have that privilege."

Dr. Leidenroth of the Armstrong Cork Co.: "Generally, yes."

Dr. Cardwell of Armour & Co.: "Not

fully, but we note a mighty big improvement lately. They are gradually learning, and with knowledge comes a greater appreciation."

Dr. Husong of the Larkin Co.: "Not in every case. About ninety per cent. The attitude of the other ten per cent. seems to be, 'Put the cost of that department in our pay envelopes. We will take care of our own teeth.'"

QUESTION 5 (A)—*Do you co-operate with the physicians in cases of systemic infection?*

"Yes," answered by ten. "No," answered by three.

(B)—*If so, have you tabulated both successful and unsuccessful results of removing oral foci?*

"Yes," answered by eight. "No," answered by two.

(C)—*Has there been a large percentage of successful results?*

Most of the replies were an emphatic "Yes," which perhaps is quite natural.

#### Quotations.

Dr. Zurbrigg of the L. D. Caulk Co.: "Seemingly results have been satisfactory both to the physicians and to the patient. Certainly some particularly pronounced cases which we were personally able to check up were very gratifying."

Dr. Heibert of the Firestone Tire and Rubber Co.: "I should say fifty per cent. to seventy-five per cent."

Dr. Elliott of the National Lamp Works: "Our medical department includes physicians, dentists, and industrial nurses. They are on duty at the same time and are in constant consultation on cases that are of mutual interest. We are now collecting a series of cases illustrating the results of the elimination of oral foci. This paper will be published in the near future."

QUESTION 6 (A)—*Do you believe it is to your advantage to remain in your present position indefinitely?*

"Yes," answered by six. "No," answered by six.

#### Quotations.

Dr. Hyatt: "Do not know. Have not thought about it."



Dr. Cardwell: "No, but I do like the work and somebody has got to do it."

Dr. Flora Nagel of the Bausch and Lomb Optical Co.: "Perhaps not so advantageous financially, but a certain keen satisfaction is gained from doing for those who otherwise never could afford it nor have been educated up to the great need of dental attention."

(B)—*If not, do you think the experience you have had will materially aid you in obtaining a practice?*

With the exception of Dr. Cardwell of Armour & Co., Dr. Smith of Heinz & Co., Dr. Bray of the American Cast Iron Pipe Co., and two others who had private practices, it was the opinion that their experience would be of great value to them.

Turning now to the *business* point of view, the replies of the managers of industrial concerns in which dental dispensaries are operated were as follows:

QUESTION 1 (A)—*Has your dental dispensary fulfilled your expectations?*

(B)—*If not, wherein has it fallen short?*

Very naturally, all of the answers were in the affirmative.

QUESTION 2—*Have you found that the time and efficiency of the employees is increased sufficiently to produce a financial balance for the company?*

It was the general opinion of all the concerns heard from that the expenditure necessitated by the dispensaries was more than compensated for by the increased efficiency of the employees. These, however, were merely the private opinions of the managers. The writer had hoped that some of the concerns selected had compiled definite data, but none were received.

QUESTION 3 (A)—*As a general principle do you consider it is better to employ recent dental graduates, who are necessarily less efficient, at a smaller salary? or*

(B)—*Men of established reputations and therefore more efficient, at a much larger salary?*

Four preferred experienced men; one preferred recent graduates, and two preferred experienced men as directors and recent graduates as subordinates.

(C)—*Why?*

*Quotations.*

Hood Rubber Co.: "I am in favor of hiring as good men as are available because, particularly in dental work, it is important to get the best available."

R. K. LeBlond Machine Tool Co.: "Cheap men cheapen service."

Colgate & Co.: "We consider it better to have a dentist of experience as the director of the clinic, subordinates may very well be recent graduates."

General Motors Corporation: "They have given good service."

The last named was the concern which preferred recent graduates for operators.

QUESTION 4 (A)—*What general means of education along Oral Hygiene lines do you employ?*

*Quotations.*

General Motors Corporation: "Factory paper and bulletin boards."

Metropolitan Life Insurance Co.: "Printed information and short talks."

Colgate & Co.: "General lectures to groups of employees and individual instruction at the clinic."

Hood Rubber Co.: "By means of our factory publication, bulletins, etc., we seek to give some education in Oral Hygiene."

R. K. LeBlond Machine Tool Co.: "Lectures, motion pictures, etc."

Apparently most concerns employ some general means of education along oral hygiene lines.

(B)—*To what extent do you believe the employees benefit by this instruction?*

*Quotations.*

Metropolitan Life Insurance Co.: "By improved condition of the mouth and health."

Hood Rubber Co.: "I rather minimize the probable value of this propaganda, but unquestionably here and there it does root. We have had more success in the direct follow-up methods than in the general methods."

QUESTION 5 (A)—*Do you have a periodical dental inspection for all employees and advise treatment? or*

(B)—*Do you wait for dental defects to manifest themselves?*

All but the General Motors Corporation replied to the effect that they have a periodical examination of all employees.

*Quotation.*

Hood Rubber Co.: "We re-examine all employees at least once a year. Those with grosser defects are followed up as a result of this examination, and condition remedied as far as practical. I think the disappointing thing in dental work is the natural antipathy of all of us toward the pain which is usually associated with the dentist. This more than anything else tends to make it very necessary to constantly follow up people in order to get their work done."

A letter received from the T. Eaton Co. of Toronto covers all of the questions and is quoted in its entirety.

"Referring to yours of 19th:

"We have fitted up a dental parlor with the most up-to-date equipment available, including an X-ray machine, and have engaged a thoroughly competent and experienced dentist. The work is confined to giving relief in cases of toothache, cleaning teeth, making examinations, charts, and when necessary making X-ray plates for employees to take to their own dentist.

"We feel that as undoubtedly ill health and often sickness are caused by a diseased condition of the teeth, employees cannot give efficient service if in ill health. We consider the increased efficiency resulting from the improved physical condition of employees fully justifies the amount expended on this work. That our employees appreciate it is evidenced by the large numbers who take advantage of our dental service."

The last phase of the subject concerns itself with organizations which do not have dental dispensaries. Nearly all of the replies received were in the form of letters covering the questions as a whole, and will be read as received. The questions to this group were as follows:

QUESTION 1—*If you have considered the matter of installing a dental dis-*

*pensary in your concern, what were the chief factors which impelled you to abandon (or postpone) the project?*

QUESTION 2—*If you have not considered it, what do you think might be your objections to installing such a dispensary?*

QUESTION 3—*If you were to operate a dental dispensary, what benefits do you think the company might expect from it?*

QUESTION 4—*Would you consider that a dental dispensary in your concern would be (a) a charitable, (b) semi-charitable or (c) a purely business proposition?*

QUESTION 5—*Do you believe that the expense of operation should be borne (a) by the employees alone, (b) by the company or (c) partly by each?*

*Quotations.*

Procter & Gamble Co.: "This company has comparatively recently started in employees' service work. Within the last twelve months we have developed employment work, hospital, nurse, full-time physician, full-time safety man, and so on. The plans are, as soon as it is convenient and in order, to instal a dental department with a full-time dentist in charge.

"It is our plan in all of our personnel work, to keep it as near as possible on a purely business basis. Of course the humanitarian idea carries considerable weight with us, but we find better results can be expected from our employees when they consider it more of a business proposition. It is the plan now for the company to bear the expense of the dental department."

Campbell Soup Co.: "We believe the proper care of the teeth is absolutely necessary for good health—however, we have not given thought to the installation of a dental dispensary, as we believe it is the absolute duty of every person to take care of their teeth just the same as they take a bath, have their hair cut, etc. The teeth of all our employees are examined regularly, and if they need attention they are advised to have them attended to."

Eastman Kodak Co.: "We have had in mind for a number of years the establishment of some sort of dental service for our employees, but have found that there are a



number of difficult problems to be solved in connection with this work. In the installation of a dental dispensary it is our belief that part of the expense of its maintenance should be borne by the employees who benefit by it; that is to say, they should be charged a small fee to take care of salaries and materials used. Should we decide to instal a dispensary it would be necessary for us to decide upon some definite way of carrying out this policy with the maximum benefit to everyone.

"The principal objects to be derived from the dental service would be increased goodwill and reduction of lost time due to untreated teeth and incidental ill health from their neglect.

"We are inclined to feel that a dental dispensary should be considered as a purely business proposition in that it is of mutual benefit to both the employer and employee. As mentioned above we feel that the expense should be shared by the company and the employee in order that any savor of paternalism or charity might be eliminated."

Yawman & Erbe Mfg. Co.: "At the annual get-together meeting of the Associated Industries of New York, held in Syracuse, March 24th and 25th, it seemed to be the opinion of many manufacturers that at the present time there is too much welfare work, compulsory insurance and group insurance which is not appreciated, at least, not to the extent that some of the sponsors for these measures had expected.

"Mr. Daniel A. Golden, president of the American Life Society, who was the first speaker on the program, made the startling statements that group insurance did not help labor turn-over or labor unrest, and that although it cost the manufacturers many thousands and thousands of dollars, it was practically lost sight of a day or two after the employees received their policy. It was furthermore pointed out that all these measures cost a considerable sum of money, and in the final analysis it is the consumer who pays the bill. Taken as a whole, the last annual meeting of the Associated Industries dampened our enthusiasm considerably regarding some of these measures.

"At the present time we are not considering the installation of a dental dispensary."

The Continental Motors Corporation replied that the "universal turn-over" of labor had impelled them to abandon the project of a dental dispensary; that the "help situation" was the chief objection to its installation, that the benefits

which the company might expect to receive were "too numerous to mention": that if one were to be installed it would be purely a business proposition, and that the expense would be borne partly by the company and partly by the employees.

The Rochester Gas & Electric Corporation conducted a very thorough investigation of this subject recently and turned over to the writer a thirteen-page report. The substance of this report was to the effect that:

(1) There would be no saving of company time, due to the impossibility of establishing a clinic at each of the company's stations, which are scattered in so many different parts of the city. Employees would take the same time as at present when dental attention is required.

(2) From the standpoint of taking care of emergency cases there would be no benefit derived, because there again employees could not be treated at their place of employment but would have to go a distance equivalent to that which they would have to travel to go to their own dentist.

(3) A large percentage of the company's employees are working on a shift basis, and it would therefore not be possible to get one hundred per cent. returns to either the employee or the company from the dental clinic.

(4) It is admitted that sound teeth add to greater general efficiency and increased health of employees, but there is no reason why the teeth should receive more attention than the eyes, tonsils, or nasal passages, all of which have a bearing on systemic diseases. In fact, were the argument carried out to its logical conclusion, it might be said that the company should provide not only a dentist but also a doctor to look after all bodily ailments and sickness, and that regular annual or semi-annual physical examinations of all employees should be inaugurated to maintain the health and consequent efficiency and happiness of the individual.

It therefore seems advisable to direct attention and energy to the end which is all-embracing and will do the most good, namely, the education of the individual regarding the few simple principles which must be observed to maintain a healthy body.

#### GENERAL CONCLUSIONS.

Industrial dental dispensaries are an established fact. From the standpoint



of the profession, they provide places for ambitious and far-seeing young dentists who have not the means to equip themselves for independent practice, and thus keep many from falling into the hands of unscrupulous advertisers.

They provide an excellent means of impressing the layman with the value of good dental service and the importance of having healthy mouths.

From the standpoint of the employers, the working efficiency and good-will of the employees are materially increased, and an indirect philanthropy is accomplished by the elimination of some of the sources of home irritation.

From the standpoint of the employees,

a financial saving is effected, and their health is conserved, two important factors which make for better homes and greater production.

It seems to be the opinion that the general installation of well-managed dispensaries in industrial concerns can only result in good to the profession, to the laity, and to industry in general.

Your Correspondent wishes to take this opportunity to thank those whose hearty co-operation has made this report possible.

33 CHESTNUT ST.

[See also *Discussion*, as reported under "Proceedings of Societies," this issue.]

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## Porcelain Base Crown.

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By D. N. LEWIS, D.D.S., Lake Forest, Ill

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(Read before the Dental Review Club, January 6, 1920.)

THE porcelain base crown has been designed to fill the requirements of a porcelain jacket crown in the case of a pulpless, broken-down tooth. The porcelain jacket crown with its clean smooth joint, and its freedom from gum irritation, has no parallel in any type of metal or banded crown. To make a jacket crown for a pulpless or especially for a broken-down tooth entails the making of a post or a pulp-chamber inlay for the support of the jacket. This requires time and expense which seems at least desirable to avoid. Efforts have previously been made time and again to grind the stock crown into place, but this was impossible in the mouth. Impressions were taken, dies and casts run as for a jacket crown, and many tedious hours were spent in trying to grind porcelain, by aid of carbon paper, to fit the end of the amalgam die which repre-

sented the root of the tooth, but the experience was discouraging and the results comparative failures.

These failures, however, stimulated further study and investigation to the extent that an effective means has been devised whereby the stock crown of any manufacture can be easily and quickly adjusted to the rough or hollow end of an irregular or crooked root, and as perfectly adapted as any jacket crown that was ever made.

When I say easily and quickly, I do not mean carelessly and indifferently. I mean easily and quickly as compared to making a perfect adaptation by means of grinding or by means of any other method of which I know. This new method I wish to describe, and I hope its fallacies will be vigorously criticized to the end that a better product may be developed.

## PREPARATION OF THE ROOT END.

The tooth is ground beneath the free margin of the gums, disregarding the irregularity of outline, and using care only to avoid injury to the gums. No scaling of enamel is required. If in the removal of decay the root or pulp chamber is hollowed out, but the walls stand sound with irregular outline on the inside, the root is all ready for impressions. If the root walls are thick and solid, showing broad smooth faces where ground by the stone, then it seems advisable to take a square end fissure bur and drill one pit about one or one and a half millimeters in size and depth in each of the four walls; labial, lingual, mesial and distal, or in as many of the walls as are thick enough. These pits are placed midway between the pulp chamber and the periphery of the tooth and the depth extended in the direction of the long axis of the root. In case only one thick wall stands, then only one pit is indicated; if two thick walls, two pits, and so on. The root end in any of the above-mentioned conditions is ready for taking the impression.

But before proceeding with the taking of the impression a post, fifteen gage if the size of the root will permit, is fitted. The post should be of round-clasp metal wire and cut long enough to extend well into the crown. It should be notched with pliers twice at the crown end and four times at the root end to give attachment for impressions and finally for cement. The post is fitted into the tooth to see that it goes to place properly and to see that it is the correct length. The end of the post which goes into the root is then heated and covered with modeling compound and while warm is forced to place in the root. There should be enough compound adhering to the post to fill the canal and pulp chamber nearly to the level of the root end.

## TAKING THE BITE AND IMPRESSION.

While the post is thus in place a bite is taken in pink wax as for a jacket crown. When the bite is removed the

post will usually stay in its proper position in the tooth; if not, it is carefully replaced in the position which its coating of modeling compound indicates. There is only one correct position for the post after the bite has been taken. Then, with the post correctly in place an individual cup impression is taken of the post and root end as for a jacket crown. If the crown end of the post has been notched it will usually stay in position in this impression as it is removed from the tooth; if it does not stay in the impression it must be carefully replaced in its proper position in the impression. The impression should be examined with the most careful scrutiny to see that the sharpest outlines of every natural or artificial dent or spur is accurately conveyed in the impression. The precise outlines of the periphery of the root are imperative; they must be clear and sharp in order to get a finely finished product.

The shades are selected, the root end covered with cement and the patient dismissed.

The individual cup impression with post in place and covered with modeling compound is packed with copper amalgam in the same manner and as carefully as for a jacket crown, excepting that in this case the amalgam is packed around the post and against the root end of the impression instead of being packed into the crown and against the shoulder. After twenty-four hours, when the amalgam is removed from the impression, the post will usually come away from the impression and stay with the amalgam root. This latter is trimmed and carefully placed in position in the pink wax bite and casts are run precisely in the same manner as for a porcelain jacket crown. When the casts are separated and trimmed the amalgam die is removed from the plaster, and the post removed from the die.

## TECHNIQUE OF MAKING THE CROWN.

The next procedure is to accurately burnish or swage a piece of platinum foil one one-thousandth of an inch in thickness to the end of the die, and into



the pulp chamber. This adaptation should be as complete as possible. It must, of course, extend beyond all peripheral margins, and it should line the pulp chamber as far as it can be persuaded to go, and if pits have been drilled in the end of the root the foil should be accurately adapted to each and every one; in fact, the foil should precisely duplicate every phase of the root end. If the burnishing or swaging has not punctured the foil it must now be perforated for the post. The modeling compound is now removed from the root end of the post, and the clean post is placed in the die through the foil. All this is replaced in the plaster cast.

The crown of proper shade is selected. No concern need be felt as to the way in which this selected porcelain fits the end of the root. It can be anything but too long. If it is too long on one side or in any part it must be ground, not carefully, but in any indifferent way, just to remove the obstruction. This selected tooth should nicely fill every requirement excepting the fit at the shoulder; it does not need to even approximately fit there. When the requirements of occlusion, contact, and alignment are provided for, the next procedure is to cover the crown end of the post with pink wax or inlay wax as far rootwise as it can be coated and yet fit to place in the root or die.

With the foil in position on the die, the wax-covered post is placed through the foil and into the amalgam root. Then porcelain, the same shade as that of the neck of the tooth, is selected and

mixed to a thick creamy consistence. The space in the foil and about the post is filled with this mix of porcelain up to the level of the end of the post. While the porcelain is of a thick creamy consistence the crown is worked down into place over the end of the post. The excess of porcelain will be squeezed out all around in every direction just as is the surplus of cement in setting a crown or an inlay. As the moisture disappears the joint between foil and fused porcelain is packed and smoothed over to the very finest detail. Foil, post, fused and unfused porcelain are all removed together from the amalgam root.

The exposed end of the post is held in the flame for an instant to melt the wax, when the post will drop out. The foil stays in place adhering to the porcelain. This is carried to the "biscuit bake," replaced on the post and amalgam root, the foil reburnished around the periphery and new porcelain added wherever indicated. If the incisal edge, the contour, occlusion or contacts need correction this is the time to do it. At the second fusing it is usually carried to the glaze. The crown is again placed on the die in the cast, and finally examined scrupulously for defects; if any, they are corrected; if none, the foil is removed and the crown is ready to set, with no apology to the gums and no prayer for an insoluble cement.

So far as the joint is concerned it requires an X-ray to determine whether it is a porcelain jacket or a porcelain base crown.



## Conservation for Preservation.

By R. P. HARTIG, D.D.S., Minneapolis, Minn

THESE words have a certain familiar ring and call to our minds in an instant that phrase, so well known to all, "Extension for Prevention." How important this principle is in cavity preparation we readily see in consulting our textbooks and referring to the authorities on operative dentistry throughout the land.

Referring to Dr. Black's interpretation of "Extension for Prevention," we find his definition to be as follows: "Extension for prevention means only the laying of the margins of cavities so near immune angles as to obtain the benefit of cleaning in the excursions of food."

How many of us have been living up to this meaning of extension for prevention? Has not our procedure been to a great extent to remove healthy tissue even when we knew that in this so-called eagerness for immunizing the teeth against further decay, we were endangering the vitality of the pulp closely approximating the cavity?

Instead of breaking down just the enamel undermined by decay, have we not needlessly cut away a good portion of sound tooth structure in order to carry out the idea of extension for prevention to an unlimited degree? Are we not all a little guilty of that desire to bring out our margins a little too far in the open—yes, often much farther than necessary?

Modern dentistry has brought out many inventions, which are indeed great time savers to the dentist but are not particularly beneficial to the patient. By these are meant the coarse disks and interdental stones used for preparing cavities for fillings, etc. It is not uncommon to see a mesial, occlusal, distal in-

lay or amalgam filling prepared with widely slashed mesial and distal walls, the work of a Joe Dandy disk, and connected with a broad isthmus, apparently made with a large size tapering Miller point. This filling could have been diminished a great deal in size with the intelligent and careful use of bur and chisel, and still would bring out the principle of extension for prevention. It is not said here that by an experienced hand the careful use of disks and stones always endangers the pulp, but mention is made of the fact that a lot of useless cutting is done when these instruments are used for ordinary fillings.

What concerns us most today? Abscessed teeth you say without even a thought. What dental work is the greatest cause of abscessed teeth, disregarding those teeth from which the pulps have been surgically removed? There is only one answer; *i.e.*, work encroaching upon and endangering the pulp.

Crowns, inlays and the ordinary fillings of every description, all are guilty, each of course in varying degrees. It has been said that the time will come when it will be a criminal operation to devitalize a pulp. Well then, if the position of the root-canal specialist is dangerous, is not that of the crown and bridge expert and general practitioner precarious, if not, then at least put in a position where he must reflect upon and inspect his technique.

Let us revert to Dr. Black's definition once more, as to the meaning of "Extension for prevention." He says it is the "laying of the margins of cavities so near immune areas as to obtain the benefit of cleaning in the excursions of food." He says further, "If this can be had in narrow cavities, it is well. If it

can be obtained by separating the teeth and building prominent contacts, that is well. If the case is one that has become immune to caries, that fact may have consideration." Here we see that conservative cutting is desirable. However, he gives three good possible ways of obtaining decay prevention: first, narrow cutting; secondly, separating the teeth; thirdly, building prominent contact points. He makes it clear that a lot of extensive cutting is absolutely undesirable, and that even in putting a step in the occlusal surface of a tooth with proximal decay "has nothing to do with extension for prevention but is designed to give the filling the greatest possible stability." In putting in the occlusal step he is incidentally able, however, to make a much shallower approximal wall; *i.e.*, one which does not encroach nearly so much on the pulp. In studying decay we find that it is not originated in the interior of the tooth but on the exterior, or enamel, and that for this reason it is the enamel we must protect, not the dentin. If the enamel is immune to decay the dentin will take care of itself. Knowing this we can better understand our dental authority when he says: "Extension for prevention does not mean deep cavities in any case. Our whole intention is to prevent the beginning of decay in the surface of the enamel."

In making our deductions from the foregoing, let us not lose sight of the main principles of dentistry, so that in applying them we are not bound by a hard and fast rule, which must never be broken in considering the case at hand.

There is not a people in the world who will allow the extensive filling and restoration of teeth with dental work in a manner that necessitates the removal of both work and supporting teeth in a few years at a great cost of time and financial compensation. There is no doubt but that a large percentage of abscessed teeth can be prevented by the intelligent application of the principle of "Extension for prevention." Why not be conservative about cutting away sound dentin and enamel and protect the pulps as we would shield any other delicate organ.

In examining radiographs we are astonished to find nature rebelling against restorative principles of man, in the form of huge rarefactions and granulomas on the root tips.

Capt. John S. Marshall of the Pacific Coast, a famed dentist and careful student, asks a few pertinent questions, "What agencies are responsible for susceptibility and immunity of dental caries; why is one individual with a clean mouth distressingly susceptible to the ravages of caries, and another individual having a disgustingly filthy mouth and who is a complete stranger to the toothbrush entirely immune?"

Then concluding he states, "Even if we extend cavities to immune areas (extension for prevention), secondary decay will often occur. Why? The most of our methods are empirical. They do not rest upon sound scientific bases and will not bear careful scientific analysis. We have fallen into the habit of following this, that or some other method of treatment because some man, setting himself up as a teacher, has said his method was the only one that would bring about a successful result."

In regard to "extension for prevention," not resting on a "sound scientific basis," Dr. Marshall may be a little strong and might encounter a good bit of opposition, when it came to applying a "scientific analysis," but, nevertheless, the fact remains that we are too liable to apply our general principles to all cases, even though some appear more immune to caries than others. There should be a little more flexibility in the carrying out of this principle and it should be in favor, decidedly in favor, of conservatism.

As long as the pendulum is still swinging between the elimination and the preservation of dead teeth, it is wise to be cautious in our restoration of decayed tooth structure. Dr. Earl Brooks of Indiana aptly says: "If we can be conservative and render the tooth and surrounding tissue free from being a focus of infection, then conservative treatment is the treatment *par excellence*."



# CORRESPONDENCE

## “Radiographic Evidence.”

TO THE EDITOR OF THE DENTAL COSMOS:

Sir,—The “Radiographic Evidence” as illustrated by Dr. Feldman in your July issue, is a beautiful illustration of directly opposite interpretations of the same film when seen by two different operators from two different points of view.

Your contributor says it “speaks volumes for the affirmative in the debated question as to whether or not unerupted impacted teeth should be extracted.”

Now from my point of view, which is evidently exactly the opposite from that of Dr. Feldman’s, I would say that the film in question was a beautiful example of where an impacted and unerupted tooth *should not be extracted*.

His first film showed undoubted extensive abrasion (not resorption) of the second molar. Under these circumstances I have extracted, and will also do so in the future, the absolutely ruined second molar, whereupon the good and sound third molar will in time (it may take three years, it may take ten years) come down and possibly take the place of the second molar, occlude with the opposite teeth and become a useful member of the dental family.

Numerous cases in my personal practice have also led me to the opposite conclusion from his as to unerupted teeth and their movement, when he says “an unerupted tooth never rests, but is continually in motion.”

I believe that is an entirely new contention, that “an unerupted tooth is continually in motion” and I would like to know by what means he discovered this “continuous motion.”

I have seen teeth that have lain loose

in the jaw as it were, at least no obstacle was to be seen, or otherwise discovered, that would prevent their “continual motion,” and yet they had not moved appreciably in twenty or thirty years.

Figure 1 is a film which shows the crown only of a lower unerupted third molar. This tooth is not now, and never was *impacted*, for it never did press against any other tooth. The patient is



now forty-seven years old, which means that the tooth has lain in that position for twenty-five years or more. There certainly has not been much “continuous motion” in this case.

Observers should be careful and discriminate between impacted teeth, teeth whose eruption has been delayed, and misplaced teeth. Undoubtedly there are many instances in which it is better practice and better for the patient not to remove unerupted teeth when they are doing the patient no harm.

Very truly yours,

C. EDMUND KELLS.

1237 MAISON BLANCHE, NEW ORLEANS, LA.



## "Case of Necrosis of Maxilla."

TO THE EDITOR OF THE DENTAL COSMOS:

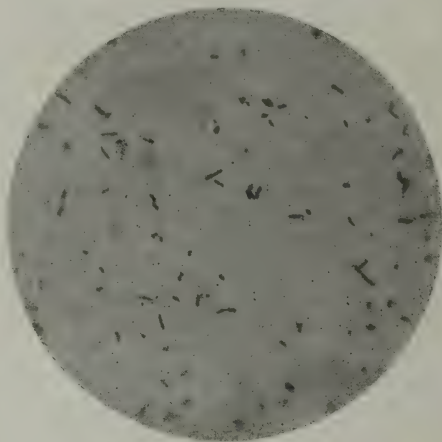
Sir,—I noted with interest the "Case of Necrosis of the Mandible" with comments reported in your columns of February, page 226, by Dr. P. G. Del Valle, followed by Dr. Walter C. Miller's letter of reference and reply. Dr. Miller concludes his letter with a request for further expressions of opinions from others, I feel that the following case will be of interest to your readers, as it is unusual for necrosis to progress uninterruptedly for so long. One cannot help feeling with Dr. W. C. Miller that blame may be unjustly thrown upon the person removing a tooth when necrosis already exists which would in all probability have manifested in the ordinary course of events. Then, too, there are so many possibilities and so few certainties when time has elapsed. And it is very easy to be wise after the event, especially if the "other fellow" was before us. But it is, alas! our human way.

The case to which I refer above is as follows:

W. T., a miner, presented early in last year with an imperfectly fitting upper denture and complaining of what he understood to be a root which was left in the alveolus when a number of teeth were extracted four and a half years previously. He carried with him such an offensive odor that his presence was hardly to be tolerated. His voice sounded very hoarse and hollow as if affected with acute coryza. On examination, an opening was found high over the gingivæ above the molar region of the superior maxilla, through which extended some hard substance found on palpation to be a large piece of bone which could be moved. An appointment was made for the following day when a piece of bone involving the external wall and floor of the antrum of Highmore was lifted out through the opening mentioned and after over an hour's hard work, a large quantity of bone which had undergone caseous

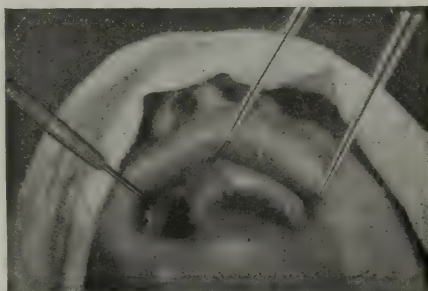
degeneration, and smelling horribly, was removed. The patient had been unable to follow his occupation regularly, had

FIG. 1.



consulted medical men and had attended the infirmary as an out-patient where the nasal trouble was diagnosed. Not being satisfied with the treatment he received,

FIG. 2.

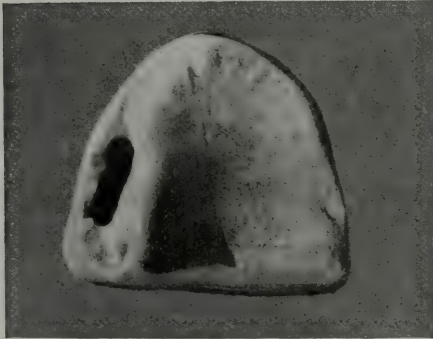


he took patent medicines and cure-alls to his great loss and disappointment.

After the cavity, which extended into nares anteriorly and to sphenoidal cell dorsally, was syringed with  $H_2O_2$  and warm saline, strips of gauze about two

feet long were saturated with sodium chlorid and carefully packed to just fill the opening. This was repeated twice a day for two days. Owing to the copious flow of pus which greatly inconvenienced the patient, it was decided to use colloidal silver. Collosol argentum (ob-

FIG. 3.



tainable from collosols), the only stable colloidal silver obtainable, which was introduced (see second report of British Association for the Advancement of Science on Colloids and Searle's Colloids in Health and Disease, London, 1920) as the result of the researches of the late Mr. H. Crookes, assisted by Sir William Crookes, was used on gauze as above. The flow of pus rapidly diminished and it was noticed that the dis-

carded dressings retained some unabsorbed colloidal silver. From time to time sequestra of bone separated and within one month from commencement the necrosis had completely cleared up and a very peculiar odor was present on the dressings, which appeared to indicate the presence of the Reading bacillus of Donaldson; but unfortunately I did not investigate the bacteriology any further.

Small doses of iodid were administered, but I am certain that there was no history of specific disease, though no antigen test was made. The nasal catarrh which worried us a great deal at the start greatly improved with the health and had left the man in three months' time. His health has remained good and there has been no further trouble. A denture was constructed with a plug of rubber accurately fitting into the opening in the mouth, which allows normal conditions of speech, but when the denture is removed the hollow voice returns, owing to escape of sound into the nares. Figure 1 is a photograph made from film stained with methylene-blue of twenty-four hours old culture in bouillon. Figure 2 shows rough model with blackened depression representing the cavity.

Very truly,

H. BERTRAM HARDING,  
F.L.S., F.R.M.S.

LONDON, ENG.

## "The Use of Cotton Rolls."

TO THE EDITOR OF THE DENTAL COSMOS:

Sir,—In the April DENTAL COSMOS Dr. R. W. Burch refers to the use of cotton rolls placed vertically instead of horizontally. Instead of these I have used paper fiber lint, cut into pieces of suitable size and shape, placed between the cheek on the one hand and the upper and lower teeth on the other, to effect the same purpose. I would consider this preferable to the method referred to. This technique I learned in the States and have found it most valuable.

Since fiber lint has been unobtainable I have used cottonoid for the same purpose, but it has the slight disadvantage of less rigidity.

I would suggest to Dr. Burch that fiber lint would serve his purpose perhaps better than cotton rolls with a cardboard center. Perhaps the makers (S. S. W.) will put this on the market again.

Yours faithfully,

HAROLD CLAPMAN.

15 UPPER WIMPOLE ST., W., LONDON, ENG.

# PROCEEDINGS OF SOCIETIES

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## Missouri State Dental Association.

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Complimentary Banquet to Dr. C. N. Johnson, Chicago, by the Missouri State Dental Association, at the Hotel Baltimore, Kansas City, Mo.,  
Monday, April 12, 1920.

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Dr. CHARLES CHANNING ALLEN, Toastmaster (introducing the speaker of the evening), said: It is my rare privilege to introduce a man known and honored wherever dentists are throughout the world. A man replete with knowledge but better full of wisdom; dignified, but not austere; reserved, but not solemn; friendly, but not fulsome; lovable, but not familiar. There is no

chamber in his heart for hate; he is a counsellor of youth. To know him is a privilege, to have him know us is a distinction, and he will be remembered, honored, and loved long after we are laid in the dust. I have the honor to introduce Dr. C. N. JOHNSON of Chicago, Ill. (Prolonged applause).

Dr. JOHNSON then read the following paper:

## Professionalism *vs.* Commercialism.

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By C. N. JOHNSON, D.D.S., Chicago, Ill.

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I very much appreciate the honor shown me in being selected to be your guest this evening, and am particularly honored that you should select a man from a distance to accept this courtesy when you have so many brilliant men in your membership. I am very glad indeed that your Program Committee assigned to me the subject of "Professionalism *vs.* Commercialism," because that is a subject in which I have been intensely interested for years. I am going to say tonight some things in a very frank way.

I have in the past tried to do what I could in the way of reform in the dental

profession, whereby our business methods might be improved. I believed there was great need of that. I think those methods in the past have been open to serious criticism, because they affected both the dentists themselves and the members of their families. We have had presented the spectacle of dentists coming to old age in a pitiable condition financially. It has been my misfortune to see men of worthy standing in the profession who have come to their declining years without the means of sustenance, and when men of that temperament have to accept charity in their



latter days it is a very bitter experience. I have even gone far enough to try to remedy a situation like that by writing a book on the subject of better business methods.

I do not wish to be considered as depreciating the necessity of the application of good common sense and system in the management of a dental practice, but there has developed lately in our midst something that I believe has a tendency to undermine the reputation of our profession. The dollar mark in dentistry was never so prominent as it is today.

Commercialism has many forms. I am going to point out some as I see them, and I wish you would take my strictures as coming, not from a man disgruntled or unduly exercised, but from a man intensely interested in the reputation of this noble profession of ours.

As I view it, most of the commercialism of today has its manifestation in an exploitation of the people on the part of some dentists. That exploitation presents itself in many guises. I will give one or two instances of what has come under my own observation as illustrative of what is going on in many localities all over this country.

One case was a patient of mine who upon her marriage moved to another city. When visiting in Chicago she was in the habit of calling on me to have her mouth looked over. Some time ago her baby was born, and for a while she was unable to travel and an accident to one of her teeth required a visit to a local dentist in her city of residence. When this dentist examined her mouth he advised her to have an X-ray taken of all her teeth. There was no occasion for such advice, because she had no pulpless teeth and there was absolutely no pathological condition present. After an examination of her teeth he made much ado about the condition he claimed to find, and said to her, "You must come here every day for two months to have your mouth put in decent condition." This alarmed her very much, and she had her husband write to me to ask if I would

care for her if she came to Chicago. She came, and the actual fact is that it took only five short sittings to put her mouth in the best possible condition. All this in the face of the dentist's assurance that it would take two months to complete the work. Do you know why he gave her that advice? Because that woman happened to have some money. That is not professionalism; it is commercialism of the basest sort.

Another instance where a man's teeth were ordered out. This man came to me on the recommendation of one of my patients. I looked the mouth over carefully and said, "I do not agree with that diagnosis." There was a time when I was inclined to be diplomatic with my fellow practitioners and to shield them, but I have now reached a point where I am rather blunt in stating my views to the patient or to the one who refers that patient to me. The physician had sent this patient to the X-ray man, and the X-ray man handed him a diagnosis with which he returned to the physician; he was then referred to a dentist and the dentist ordered the extraction of all the teeth, basing his advice on the X-ray diagnosis. The patient was frightened, naturally, and came to me. I said frankly that I did not agree with the diagnosis. He said, "What shall I do?" I replied, "Tell your physician to call me up." The physician did so and said to me, "It has occurred to me it would be a good thing if that man had his teeth all out, because I doubt whether he will take care of them." I asked, "Do you mean to tell me a man who says he would rather lose his left hand than his teeth won't take care of them?" He said, "Did the patient say that?" I told him "He did." Just before the New Orleans meeting I received a letter from the patient to this effect: "I have had my tonsils taken out and have just had a culture made from my saliva, and they are going to see if there is any streptococcus there, and if there is, I will let you know." I took the time, even though I was in a hurry to leave for New Orleans, and wrote that man, saying, "My dear Sir,—I predict that they

will find the streptococcus there because they can demonstrate it in every mouth." Finally he came back to my office to insist upon becoming my patient.

The point I want to make is this: A man who knew enough about bacteria to look for streptococci knew that he would find them in that mouth. That is exploiting the people and frightening them unnecessarily. This man I referred to still has all of his teeth and he is in splendid physical condition.

I make no complaint whatever about the investigator who looks for the truth and tells his patients what he finds, but I am quarreling unceasingly with the practitioner who takes advantage of his professional status to make an impression upon a patient and leads him to believe his condition is serious when it is not.

Then some of the courses in the curricula of the schools on business building lay too much stress upon the necessity of higher fees. The custom of taking money from the people without a consideration of the patient's point of view is not right, ethically or morally. There is too much of that going on today all over the country.

#### EXPLOITATION OF THE RADIOGRAPH.

Now, a few words about the value of the X-ray. I wish first of all to pay my tribute to the usefulness of this wonderful process. There is nothing that has come into our profession, in my judgment, that is so valuable in the hands of a conscientious and able investigator. I take off my hat to the radiodontist who is sincere and earnest and equips himself properly to search for the truth, and I wish to pay my tribute to the practitioner who sincerely endeavors to apply the findings of the radiograph, but the way this thing has been exploited today is a disgrace to our civilization. I know how it works out with us in Chicago, I do not know just what the situation has been in St. Louis and Kansas City, but the method of procedure is something like this: A patient becomes ill. He goes to his physician, and this

being the era of attention to the condition of the teeth in the medical fraternity he is at once sent, without adequate physical examination, to the radiodontist to have an X-ray made of the teeth. Now, the things the radiodontist does not do in his investigation could be told in a few minutes; the things he does do can never be told. The radiodontist, whether he is a qualified dental practitioner or a physician, or whether he is a man who simply takes pictures and does not know anything about the anatomy of the mouth or etiology of disease and does not know anything about pathology, will write a diagnosis of that case. He will send it to the physician or, what is worse, hand it to the patient. The things he writes upon that diagnosis in many cases are a disgrace to humanity today.

He will write "abscess," "infection," and if he cannot find anything else, he will write "pyorrhea," and now they have adopted that term "osteoclasia," which makes a most wonderful impression upon the patient and usually succeeds in scaring him nearly to death. The physician, who in many instances knows nothing about the etiology of the teeth, takes that radiograph and refers the case to the exodontist with his recommendation to extract. The family dentist is too frequently ignored. He has records of all these operations and can throw some light on them, and in all conscience has as much interest in the patient's welfare as the radiodontist. The impression made upon the minds of the patients reading such terms as "abscess" and "infection" is difficult to eliminate. People have died of infection, as they know. Abscess is a dangerous condition, and the worst feature of all is that these men will find infection in every case. It does not have to be there in order to be found. One of our leading X-ray men has said that it was a brave radiodontist who had the courage to say that he did not find anything pathological. I have not met many men of that type in my experience in Chicago. I hope there is such a man in Missouri. I at least know that there are many men in Missouri



who are doing careful and conscientious X-ray work and I pay my tribute to them tonight. They show us things we cannot find ourselves. But my understanding of the position of the X-ray man who acts as an intermediary in these investigations is that he shall not give a diagnosis to the patient. I will not allow one to be handed to one of my patients if I can help it. No radiodontist, I care not how expert he is, has a right to say, "You have an abscess at the apex of that tooth," because he cannot demonstrate an abscess by the X-ray. The best X-ray men know that and they are frank enough to tell you, and I want to say here that the future of the benefit of the X-ray lies with the men of that type, who are conservative enough to be constructive instead of destructive.

I had a case just last week of the wife of a physician, who came to my office with an X-ray diagnosis reading in the usual way, as described above. This diagnosis had been made by an X-ray man who was also a dentist; she was referred back to her own dentist. The consensus of opinion of those two men was that the lower right first, second, and third molars and bicuspid should be extracted. The pulps were alive in all of those teeth except the first bicuspid. On that X-ray diagnosis was written "Serious infection at the apex of the third molar"—and it was a tooth with a live pulp! On what ground did he make that diagnosis? Dr. Simpson of St. Louis can tell you. The inferior dental canal runs along there and it cast a shadow. The radiodontist called it an infection. God save the people!

That woman was very much alarmed; her husband being a physician she knew the consequences of infection. I told her to go back to her husband and tell him that those teeth did not have to come out, and to tell her dentist they did not have to come out, and if there was any further controversy about it to call me up on the telephone. The dentist never called me up, which was rather lucky for both of us perhaps. The husband called me up and said it had greatly relieved his mind. That is another case

of exploitation of the people which I am contending against. Let me tell you the X-ray man must stop giving a diagnosis to patients and frightening them unnecessarily. Let him tell all he knows or thinks he knows or can interpret to the physician or to the patient's dentist, but with the explicit understanding that the information does not go to the patient unless it is necessary. Very many patients have been stampeded with fright into the extraction of numberless perfectly useful and harmless teeth, and it is time to bring that sort of thing to a halt.

#### CURETTING SOCKETS AFTER EXTRACTION.

Another thing that has broken out in the profession is this wonderful idea of curetting every cavity or socket from which a tooth has been extracted. For years we went along extracting teeth, sometimes not extracting as many as we should, but extracting teeth that were badly diseased, and the gums healed up promptly and the patient got well. And now all at once we have discovered those sockets must be curetted. Why? Many of these curetting operations are done to see how deeply the operator can dig into the purse of the patient. Curetting is sometimes necessary, but the cases are very rare relatively to the number of teeth that are extracted. A professional man is entitled to a good fee for his services, if he works conscientiously and carefully. His years of usefulness are limited and he should be recompensed to a degree that he is not compelled to become dependent upon charity in his old age; but the exaltation of the idea of fees before service is pernicious, and must be combated. A man in Chicago the other day made the statement that unless ninety per cent. of your patients complain about their bills your fees are not high enough. I should say that if nine per cent. complained there was something wrong with a man's methods.

The professional man should have the question of fees come up in his practice very seldom after he has been in a community a few years. Let him get good



fees, but this constant contention over fees is a demoralizing habit in a profession.

I have given the best energy of my life in the last few years without expectation of a fee at all. It has come about in this way. Some of the medical men in Chicago have heard that I combated this universal extraction of teeth, and have gotten in the habit of sending patients to me with X-ray diagnoses. The patient usually comes with a diagnosis from the X-ray man that there is grave infection there. I look them over as conscientiously as I can and send them back to their dentist with the statement: "Tell your dentist frankly what I think about the case, and have him call me up and we will consult about it." Now that takes up time, and it would be perfectly legitimate to charge a fee, but I cannot bring myself to do it. Do you know why? That patient not feeling well goes to the physician; he is sent by the physician to the radiodontist, and they both charge him a fee; then he comes to me and I send him back to his dentist, who expects another fee, and if I make the chain complete by charging a fee, after the patients go through this process they begin to think it is nothing but graft. I want to do something in my profession, if I can, to do away with that idea. I do not want the profession to have the reputation of grafting and I make all sorts of excuses for not giving a bill to the patient. My own office force blame me for not making out a bill, the physician blames me, but I am going to have a clear conscience in the matter. I do not tell the patients that I do it for them. I would not do a thing as demoralizing as that, because I want them to think that professional service is worthy of a fee, but I say, "I am doing this for your physician, or for your dentist as a matter of courtesy," and I get them out of the office with the feeling that the chain of graft is at least broken in one part. As I say, I have given the best energy of my life to that and I am going to continue to do it.

When the time comes that dentists think more of the money they make than

of the service they render, when they expend their energy in exploiting the people rather than in conserving their welfare, when they study methods of business more than methods of practice, when they exalt the god of mammon above the divinity of service, when the sordid and selfish shall have assumed ascendancy over the sublimity of sacrifice, then this profession of ours shall sink in the deepest depth of degradation, and we shall be known as men not fit for professional status, not worthy to associate with those of culture and refinement; not even entitled to a place beside the common daily laborer, because we have besmirched our profession, and betrayed a trust reposed in us by the sturdy old pioneers of the days gone by, who by their unselfish sacrifice and devotion to humanity have handed down to us a profession imbued with high ideals, whereby we are enjoined to serve humanity in an honorable way rather than to use our calling as a cloak to impose upon the people.

Gentlemen, it remains for you and for me to choose whether we shall exalt commercialism above professionalism, or whether we shall so conduct our affairs that while reaping a legitimate material reward we shall at the same time as professional practitioners be able to look every man in the face, and not hang our heads in shame.

I wish to express again my keen appreciation for the privilege of meeting with you on this occasion and under these particular auspices. I am profoundly impressed by the compliment which you have paid me and am going to take back to Chicago an even larger place in my heart for the dentists of Missouri and Kansas than I ever had before. I appreciate the compliment you have paid me, and shall try in the future to be worthy of it.

**Dr. J. D. Patterson, Kansas City.** I am very glad to respond to these remarks, because I can say I truly love Dr. Johnson. He has been the man for the dental profession who has taken the place of a balance wheel. In any profes-

sion or walk of life the whole profession and even whole communities sometimes come to an *impasse*, and do not know which way to turn. In the dental profession we have had at various times what we call fads; sometimes they were beneficial, sometimes detrimental. In all these exigencies that have come into the profession Dr. Johnson has acted as this balance wheel, and his influence has had a tendency to steady the members of the dental profession. Going as far back as pulp protection, cataphoresis, and even down to the X-ray, he has been a brake upon the illogical enthusiasm of a great many in our profession and he has brought us through a great many troubles. His advice has always been well received and very much appreciated.

He comes to us today with a message of great importance. The dental profession, as a profession, has a multitude of critics, and this propaganda that he has been talking about of commercialism, which has been brought about largely on account of these so-called efficiency lectures and writings upon salesmanship, it seems to me is going to do us more injury than anything that has come before the profession in all the years I have been connected with it. I am very much interested and very earnest in regard to this effort to try and combat this commercialism which is spreading all over the country.

Man in his career first started out as a predatory animal, like Satan, going up and down the world seeking whom he might devour; after a while as humanity increased and civilization developed, that hunger became somewhat tamed and we trust eventually it will entirely disappear. But when we look upon conditions in the dental profession as described by Dr. Johnson we are sorry to see it is not yet dissipated. This predatory instinct still remains, and this commercialism is an instance of that tendency of mankind to prey upon the weaker members of society.

We know in a low grade of society there obtains a low moral tone and as civilization advanced morality has be-

come more disseminated and we have grown away from those more brutal instincts until it finally crystallized into that great paean of the great Teacher, "As ye would that men should do unto you, so do ye even unto them."

It seems to me this commercialism which is so rampant is an evidence of that low grade of humanity. Let us look at it in that way, my dear brothers, and let us rise above it and fight it as hard as we can. In that way only are we going to blot out this miasma which is creeping over us, and which will eventually make the public our enemies instead of our friends.

The keynote of Dr. Johnson's address which I am trying now to emphasize is this: Ethics should come first, and the consideration of profit should be subsidiary. The best service rendered in the best manner demands a good fee; anything above that is uncalled for and may justly be termed profiteering and grafting, and this having become so general, to my knowledge, it seems to me will eventually, if not stopped, sweep the whole dental profession over the whole of the United States. If you believe in morality you have to believe in ethics and professionalism; without it, we commit suicide.

Bacon in his quaint way has phrased it, "I hold every man a debtor to his profession; from the which, as men of course do seek to receive countenance and profit so ought they of duty to endeavor themselves by way of amends to be a help and ornament thereto."

That is as true today as when Lord Bacon said it. We cannot be an ornament or lend help to our profession unless we war against this commercialism that has been spreading all over the country.

There is but one stand you can make upon this question. You must be for commercialism or against it. I might paraphrase the saying of an old writer: "There are certain sons of men born on earth named children of genius. In life and in professional life each comes to the parting of the way and chooses; he



chooses for others or for himself, but forget this never: Whatever his choice there is laid upon him a burden that is not laid on others; his choice is infinite; the world is open before him, and if he fail let men curse rather than weep, for he was born a son of God."

Take that to our minds regarding the question we are talking about tonight. Are you going to fight against this wave that is threatening to engulf our profession? Are you going to choose that path or are you going to permit it to go on, perhaps unassisted by you but not combated by you, until it swamps us all?

Let ethics and service be first, let consideration of profit be secondary.

Dr. ALLEN. Dr. Conzett, the president of the National Dental Association, was to have been our guest tonight, but was called on business of our profession to Pittsburgh, Pa. He gave me this tribute to read as concerns our honored guest:

It is a positive grief to me not to be able to be with you on this occasion of your banquet in honor of the most lovable character, that prince of dentists, Dr. C. N. Johnson. He is one of Nature's noblemen, a man who has always stood for the best things in dentistry and for the best things in life. He has always been an inspiration to me and to thousands of others.

He has had a warm spot in his heart for the young men, and many a beginner he has helped with his counsel and kindly interest. He has been a great influence in aiding me to attain what little I have been able to accomplish in the way of teaching and writing, for in one of my first efforts he so kindly complimented me that I took courage to undertake further effort.

We love Dr. Johnson because he loves us, and makes his love known in the kindly glance of the eye and the warm clasp of his hand. He, more than any man I know in the profession, most truly represents the spirit of the poet, when he says:

"Lord, let me live from day to day in such a self-forgetful way,  
That even when I kneel to pray, my prayer shall be for others.  
Help me in all the work I do, to ever be sincere and true,  
For what I do for You, must needs be done for others."

And in that last great day when the books are opened, and men shall be judged for the deeds done in the flesh, I am sure Dr. Johnson's name will stand beside Abou-Ben-Adhem's, and he will be told his name leads all the rest because he loved his fellow men.

JOHN V. CONZETT.

Dr. H. F. D'Oench, St. Louis. Had I been forewarned of the fact that I was to be called upon I might have been able to more nearly do justice to this occasion.

Dr. Johnson has been a great inspiration to me also. Many years ago, as president of the St. Louis Dental Society, I called upon Dr. Johnson to come to St. Louis. Unfortunately he had to decline and I felt that his excuse then given was adequate. I knew the sincerity of the man and how he loved the profession, and so I did not take "No" for an answer. I went to his friends in our city and told them that we must have Dr. Johnson for the reason he represents just that which our local profession needs at this time; that is, the influence of a well-balanced man who could harmonize the conflicting elements in our group. Having explained the situation, a dozen of us in the city signed a letter begging Dr. Johnson to reconsider his decision, and as usual Dr. Johnson appeared to the largest attendance up to that time in the history of the dental profession of our city. The very fact that he was coming brought out the men; we had been reading his magazine and reading his books, we had been getting inspiration for years from this able speaker and writer, and when he came he left with us a solidarity of spirit which has radiated and enriched us ever since.

That was the beginning of the co-ordination, the evolution of solidarity of the profession of our city which has since crystallized into the substantial, fine fellowship of which we are justly proud.

I believe that the subject of our honored guest's speech this evening is going to work out, not in the manner discussed by Dr. Patterson in a pessimistic way, but in the usual way of all American groups, overcoming the evil



which permeates our profession. I know men of our city who are men of innate integrity and fineness of character, which made them choose a profession rather than a commercial life, and they when called upon will conquer this evil, and we shall maintain those noble standards of our profession.

I am sure that our fears in the future will be justly allayed and lost as to the lowering of the standard of ethics in our group.

**Dr. F. O. Hetrick**, Ottawa, Kans. I do not know when I have felt so much at home. I see so many Kansans here. I have come to the conclusion that Missouri cannot have a real good dental meeting without a lot of Kansas people. I well remember the first time that Dr. Johnson came to Kansas. We gathered as many as thirty-five members at our meeting. He came before us and gave us the gospel of contour gold filling. It was the time that Arthur was cutting everything out and leaving nothing but a shoepeg with the small end up. Dr. Johnson was the pioneer in contour work for the preservation of the interdental space. This was away back, I think, in 1884. Dr. Johnson has always been since I have known him the same genial, whole-souled man, and has always stood for what is right. That is why he is coming before you and hitting some of you fellows that are charging more than your work is worth.

If you are delivering service it takes more time, and if you are doing it better than somebody else, you are perfectly right in charging a greater fee. I know sometimes it is the man who is less competent who gets the largest fee, but not always, and he does not very often get it twice from the same patient.

I wish to add my testimony to the value of the X-ray machine, and would like to urge upon every man here to own a machine, because there are many things you cannot do competently without its aid. I am not in favor of extracting every devitalized tooth. I do not believe it is called for. I do not believe I am competent enough to fill every three-rooted tooth and not have any failures.

In fact, I do not attempt to fill many of the tri-rooted teeth. Life is too short and I am nearing the sunset.

Dr. Talbot is another member of the profession that came to Kansas the next year after Dr. Johnson and spoke to us about how we should magnify our profession. I believe the schools are somewhat to blame for not turning out better educated men in the medical way, because they have not been forced to be more efficient. We have rather looked upon our work from a mechanical standpoint, as a sort of mechanical adjunct to the practice of medicine. We do not know as much about therapeutics as we should, and if the schools are going to add another year to the course, I hope they will give nearly all the last part of it to medical education.

We know of so many complications that may affect the human system via the mouth as the source of infection. I am not ready to subscribe to the advice that every devitalized tooth should be extracted, but if you are trying to bring a sick patient back to health you want to know why you do it. If you know why you have taken a certain procedure in one case, you will know what to look for in the next one, and as your knowledge increases and as your ability to handle cases of that kind improves, your service is worth more.

I might be said to be at a point where I could be called a profiteer, if you please. I do not charge for every consultation that I have, but if another dentist sends me a patient with an X-ray for examination, I do not read it to the patient, I send my diagnosis to the dentist, and I get my fee out of it.

I believe that the average radiodontist is an honest, intelligent man trying to help humanity, and I believe the average man that gets good fees has no idea of doing other than good service and returning full value to his patient.

**Dr. C. N. Johnson.** A term has crept into our discussions that I want to refer to. It is a term that has been responsible for the loss of many good teeth, and that is the expression "dead tooth." That term never should be used

in connection with pulpless teeth. A pulpless tooth is not necessarily a "dead" tooth. That term used so recklessly in our profession and going out to the medical profession has created a prejudice against pulpless teeth more than any other one thing. The medical profession naturally does not want anything dead to remain in the human body; neither do patients want anything that is dead to remain in their physical makeup. We have therefore the obligation to eradicate that term "dead tooth" from our terminology. Neither should we use the term "devitalized" tooth; we must take that term from our nomenclature. You do not devitalize a tooth when you destroy the pulp. All you have to do to disprove that is to watch the demonstration made by Dr. F. B. Noyes showing that a pulpless tooth is not dead, that if it were a dead tooth it would not remain in the mouth. Nature will not tolerate anything like that.

Let us stick to the proper anatomical term "pulpless tooth," and then the medical profession will not be so prejudiced against us.

I want to see every man who writes and speaks take out of the nomenclature that term "dead tooth" and also the term "devitalized tooth." It is a vital tooth.

**Dr. Burton Lee Thorpe**, St. Louis. I was interested, as I always am when I listen to Professor Johnson. I have admired him immensely for his life and his many valuable contributions to dental literature. I think all that has been said of him here tonight is the truth. He is one of the best loved and honored men in our profession in America and throughout foreign lands where dentistry has made any advancement.

Many things might be said upon the subject of his discourse here tonight, but I know you are exhausted from so many various speeches and will merely mention by way of anecdotal illustration two rather good things I heard at New Orleans. One was a story told of a student who was asked immediately after graduation, "Can you cure pyorrhea?" He replied, "No, I cannot cure it exactly, but I can prolong it." (Laughter).

The other was a remark made by a member of this association who is here tonight. He is quite a noted member of the profession in this city. In conversation with some other men regarding the dentist's ability to fill all root canals properly one of them remarked, "Well, Jim, I imagine that you fill all root canals properly," He answered, "Well I formerly did until the d—— X-ray was discovered and came into general use in dentistry." (Laughter).

You know that the testimony of the radiograph has convinced many of us of our faults and failings even though we had a very high opinion of our work before we saw the picture.

In Dr. Johnson I am reminded of that famous and ancient Biblical character Zerubbabel, whom you know was a relative of King Solomon, a Tarshatha or governor of Judea, a man of considerable reputation in that country. When offered jewels of great price, and even the gold vessels of the temple and fine raiment, as a bribe for the doing of that which was dishonorable, he refused to be tempted and turned them all away. His honor was unimpeachable. In my estimation Dr. Johnson has been a modern Zerubbabel of this generation in dentistry, in truth and in deed. We are very much indebted to him for the things he has contributed, and his high example of ethical right living and moral character.

Now, Mr. President, Dr. Digges, I desire upon this occasion, and think very fitting indeed, that we may have the pleasure and do ourselves the honor of electing Dr. Johnson an honorary member of the Missouri State Dental Association, and I am delighted to propose his name for honorary membership in this society. (Applause).

**Dr. PATTERSON.** I second that.

**THE PRESIDENT.** You have heard the motion made and seconded. All in favor of that will rise to their feet and so signify.

All present rose and drank to the health of Dr. Johnson.

Dr. Johnson was unanimously elected.

**Dr. Dayton Dunbar Campbell**, Kansas City. When the war was at its height, there was an Irish captain who,



just about to take his troops over the top and wishing to learn something of the temper of his men, called them together and said something like this: "Boys, tonight we go over the top. What I want to know is will yez run or will yez fight?" They vociferated, "We will!" "Will what?" he asked. "We will not." That is the way I feel when asked, "Campbell, will you talk or sit down?" "I will."

A few years ago there went down into the Ozarks a scribby kid with a diploma to practice dentistry. He practiced for a few years, when he was invited to go back to his alma mater and read a paper. He started to write a paper upon the topic of "What Not to Do in Dentistry." Don't do this, and don't do that. Don't use your mouth for a chip blower and a few other don't's, until he came to a point where his ideas gave out and he did not know how to finish the paper. Finally he began browsing through some books, for he had to finish by quoting from somebody else, and so he finally ended up by saying something like this: "Don't fret. Don't worry. The happiest period in a man's life is when he is climbing. If a mountain of difficulty confronts you, face it, and it will disappear like fog before the sunshine." And so he went on and said a number of beautiful things. That paper got into a small dental journal and a portion of it was afterward published on the back of the DENTAL COSMOS, in June 1907, and when it came out it ascribed as the author "Dayton Dunbar Campbell, D.D.S.," and I tell you I felt sheepish and ashamed.

About that time there was a grand and glorious man wrote a letter to this particular Dayton Dunbar Campbell down in the Ozarks and inquired, "Where did you get that particular little piece of writing?" and I replied, "I got that out of a book and a man named Blank wrote it." Well, he replied, "Several years ago I wrote something like that." I wrote back to him and said, "I did not intend to do that, what shall I do?" He replied, "Do absolutely nothing about it." That was nineteen years ago, and

this is the first time in those years I have ever mentioned it. Our good friend who has appeared here tonight has been the most potent factor in my growth, if I can be said to have grown, with the possible exceptions of Drs. Black, Allen, and Patterson. Our honored guest of this evening, Dr. C. N. Johnson, is the man who forgave that unintentional plagiarism, so you must know how kindly I feel toward him. When he met me down at New Orleans he threw his arm around me, and my wife remarked, "That man must think a lot of you." I told her he thought just that way of every young man who is trying to be progressive, and has an outlook for the future. If at some future time I shall fill some niche in my profession, if I can receive some of its emoluments, yet if I can feel in a small measure as a little Dr. Johnson, I shall think I have received my professional reward.

**Dr. C. L. Hungerford**, Kansas City. *Mr. Toastmaster, Mr. Johnson, and ladies and gentlemen,*—I thank your toastmaster for his courtesy in permitting me to pay my compliments to Dr. Johnson. I feel that no higher thing can be said of a man than that when the dust of the pathway of life is silvering his hair, the flowers of youth are still blooming in his heart.

His heart goes out to the young men. He is interested in the honor of his profession more than in personal emoluments or personal financial success.

I was raised in that old school of Patrick, McKellops, and Harlan, a school of which Dr. Johnson is a master. They taught me the things then that he is preaching tonight. They taught me to get good fees, but to be just to my patients.

Years ago I was in the studio of a very celebrated artist, one of our great painters, and he was not in very good financial circumstances; a very wonderful artist, who painted but few pictures but got a fair return for them. You know among the painting fraternity, it is customary among a large percentage of them to put out what is termed in slang "pot boilers," sign their names to



them and get quite a good fee from them. It takes perhaps an hour or two or a day to paint them, whereas a painting of which they may be proud takes them months to execute and requires the most patient drudgery. I asked him, "Why do you not paint some of these 'pot boilers' like the rest of them?" He replied, "I can't do it." He did not say he would not do it, but he meant there was something in him, as there is in the heart of every honest professional man that will not let them make money at the expense of the reputation of their calling and depending for success upon the gullibility and ignorance of the public.

So I feel that what Dr. Johnson has said tonight is a thing I would give pretty near all I possess if it could be graven upon the minds of every member of the profession in Kansas City and throughout the State.

I cannot help but feel deeply, when I speak of the radiographer sending information to you and to the patients that such and such a tooth shows evidence of

infection. How does he know it shows evidence of infection? Does the X-ray show evidence of infection? You can take a section of cancer, streptococci viridans in milk broth, cow's milk, and plain water, put them all in different tubes and send an X-ray through them and in the radiograph they will all look alike. The X-ray does not show infection.

I do not think any subject could come before the dental profession today, when so much misinformation and unwarranted ignorance exists among medical men as regards dental teaching, that would do more good. I think such information should be sent broadcast and published in the journals and even the daily papers. I would like to see our morning papers contain something of Dr. Johnson's talk to you tonight. I can say nothing more to add honors to Dr. Johnson. The entire profession of this country and Europe honor him, and his name is in the Hall of Fame of the dental profession.

Adjournment.

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## Odontological Society of Chicago.

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Regular Meeting, held May 4, 1920.

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A REGULAR meeting of the Odontological Society of Chicago was held May 4, 1920, with the president, Dr. Truman W. Brophy, in the chair.

The President introduced the speaker of the evening, Dr. FREDERICK B. NOYES, who read a paper entitled "The Mouth as a Gateway of Infection."

[This paper is published in full at page 1035 of the present issue of the DENTAL COSMOS.]

### DISCUSSION.

**Dr. Sidney J. Knowles.** The statement Dr. Noyes made about the effect

of food on the tissues I wish to take exception to. My idea has been that one of the principal causes of dental pathology has been due to the lack of use, rather than the overuse of the teeth and soft tissues. I have always felt the reason our ancestors had a better dental equipment was because they used their teeth more. The duck has better wings than legs and the ostrich better legs than wings because they each use these parts more, and the average individual now does not have good teeth and healthy gums because he does not use them enough. It seems to me it is rather dis-

couraging to think that the rather normal use of the mouth in chewing coarse foods will open up a gateway of infection.

I have in the last few years become very enthusiastic about the question of prevention, and the reason why we should exercise particularly the soft tissues. Boys going to school, taking part in athletics, develop their arms and legs but do not exercise their teeth and gums enough. In that way they suffer from lack of use, so I cannot agree with Dr. Noyes in his statement, but I can see that he has brought out in a very beautiful way the opening where infection may enter the system at a rather early age.

I think this is a subject that none of us know enough about, and from now on it should be given more serious thought than we have given it before. We usually look through our glass and just see teeth. The tendency from now on will be to see the patient and then fit all things together, and perhaps protect the generations to come by prevention.

**Dr. L. L. Davis.** From the thoughts that have been expressed by Dr. Noyes this evening, to sum up the whole matter, it seems to me we have to begin on the parents instead of the children. It is impossible for the dentist to lay out a line of work for the children unless he has the complete support of the parents. As I see it, the trouble with the children of today lies with the parents—the way they have been brought up and allowed to take the things which they have wished for rather than the things that are good for them. The children say they do not like this and that and they cannot eat this and that or the other thing, and the parents allow them to have whatever they seem to wish for. So if we are going to begin any movement toward the upbuilding of the race we have to start by instructing the parents what to do. The only thing I can see that the dentist can do at the present time is to look after the conditions as they are in the child. Certainly there is no method of instructing the child, at the age at which Dr. Noyes wants us to start out on the work, that will appeal to it. It must be done by the parents.

One little point in regard to caries, and that is the condition of the teeth as they come out of the hands of the orthodontist, after removing the bands that have been placed on the teeth. I have seen so many children with a chalky enamel line almost all around the teeth, the width of these bands, and I have seen those children after reaching adult life develop conditions in which it has been necessary to do considerable repair in order to prevent the loss of the teeth by caries.

**Dr. Edward A. Royce.** I rise only to thank the essayist for his clear and delightful presentation of the subject, which is new to me in the strictest sense. It is a presentation which seems exceedingly practical. We have heard a good deal recently of preventive medicine and the part the dentists should take in it. It seems to me Dr. Noyes has presented very forcefully the subject of preventive dentistry, and that is the great essential in the practice of that profession. He has outlined what is the most important thing in the line of dentistry.

I trust that much permanent good may come to the profession and the community from his work.

**Dr. C. N. Johnson.** The subject of the mouth as the gateway of infection is a very important one, and has been recognized for many years, almost ever since I entered the profession. Dr. Noyes has presented it to us tonight from a little different angle, but it brings us back to the same old subject that we are most interested in, the subject of prevention of diseases. The status of the mouth as a factor in the general infection of the system has not been definitely settled yet. We do know that the only tangible and feasible means of controlling these diseases is to prevent them.

The speakers have mentioned that we must get at the child and then go farther back and get at the parent, but we will never control dental diseases until we have educated the common people as to their seriousness. It must be done in the home, rather than in the office, and we must educate these people first as to the



significance of dental disease and then as to the means of preventing it. It will be a long slow process, but that is the only way it can be worked out. It is a matter more of the maintenance of function than any other one thing and the people must be educated up to the significance of function before we can make any progress in the way of prevention.

**Dr. P. J. Kester.** I should feel myself an ingrate if I did not acknowledge the obligations I am under for the experience of the evening. I think I have never heard a paper that has impressed me more than this particular presentation tonight. I have followed the dental literature very closely, but this is, as far as I know, a new theory in regard to systemic disturbances which have their origin or distributing point in the mouth. I have long thought that the tonsils and the adenoids were probably the guardians of the body, and that when they were doing their work properly they assisted very largely in preventing entrance of destructive elements into the system, but that when they become diseased they then become a menace to the health of the patient. I never have seen it suggested that the most common and most likely point at which the disturbing elements of the body would enter was through the infected soft tissues of the mouth. It was a wonderful picture to me and I think I have never been so generally stirred as I was by the presentation and demonstration of the subject. It means to me a new thought in dental pathology.

**Dr. J. E. Hinkins.** I am not surprised at what Dr. Noyes has given us, because I know he has worked diligently for many years on the membrane and its function, and am sorry that I am in a position where I cannot appreciate more clearly what he has done with this work. It brings out an entirely new thought in the way he has presented the subject tonight, and it shows quite forcibly that after all, one of the most important things is the nutrition of the child and the education of the parent along that line. It so happens that in my practice I have had a good many

children to handle, and where we could begin with the child when it was on the mother's breast and see that she was giving enough nourishment to the child to properly feed it, and if not, to assist that child by the giving of proper foods, I did not have much trouble in the first or second dentition, or in the after development of its teeth if it had been kept on the proper diet, and we had the co-operation of the parents and the family physician. If we did not have that co-operation it made me sick to see the poor little things, and to think what a poor dentist I was that I could not prevent such conditions. It goes back, as Dr. Davis said, to the parents and the proper training. If I can have a child on whole milk, whole wheat, a balanced diet with pure vegetables run through a colander and mixed with the milk, I have very little trouble and have practically no cavities to fill.

**Dr. J. G. Reid.** I have seen no reference in any literature that I have read to any such condition of affairs as has been elucidated tonight, and I would like to ask whether any of you have ever seen a mouth of deciduous teeth at seven years of age that was entirely free from disease of any character? (Several members answered, "Yes, a great many.") I may be a poor observer of mouths and patients, but I am surprised. I have practiced dentistry forty-four years in the City of Chicago and I have never seen but one child in that period of my experience that had a mouth that was, at seven years of age, with every deciduous tooth in the mouth, perfectly free from caries. The condition is so rare that it is a curiosity.

**Dr. F. E. Roach.** I do not rise for the purpose of discussing Dr. Noyes' paper, because I am not capable of that, but I do appreciate very much what he has given us this evening. It is a little alarming in a sense, yet we have become accustomed to these alarms from many sources, and many kinds of alarms we have had given us about oral infections. I think it is a very timely presentation, calling our attention to this one phase, this one particular kind of focal infec-



tion, to which we have not given enough consideration. We have heard a great deal in the last few years about oral focal infection, and more particularly about abscesses in that area. It seems to me it brings to our attention very forcibly the great importance of the things to be considered by the profession today,—that of prophylaxis, prevention, doing all we can in our procedures of repair, whether it be a crown, a filling or repairing a bridge, or whatever it may be. It certainly brings to our attention the importance of the very greatest care of the tissues surrounding the teeth. It seems to me that is the lesson I have gained from this paper more than anything else. Dr. Noyes has pointed out to us in such a beautiful concise way, which we have not had before, the necessity of these things. We could expect this from Dr. Noyes, for he is a master in this field, and it is only one of many of the good things he has given to the profession. Personally, I feel very grateful to him for bringing this out so clearly. We have heard a great deal of the importance of the care of this part of the mouth but it has never been made so clear to me that this could be the source of such direct invasion of infection.

**Dr. W. H. G. Logan.** Dr. Noyes has spent a great deal of time on these two subjects, the dental membrane and the beginning of dental caries. He showed you one or two slides of the beginning of dental caries. The dental profession has not paid sufficient attention to these things. They often see a little cavity and say "Let it alone," and do nothing to control or remove the rough surfaces. By going in a little depth it is possible to control that caries. So far as I know there is nothing we can do at this time to control it except by way of local treatment. If we know of nothing except the local treatment we wait for the solution of the trouble, but in waiting for a definite cavity let the surface be smooth and polished, and you may prevent the destruction of the enamel.

Regarding the question of the periodontal membrane and the gingivæ, I have always had the opinion that if we

have the soft deposit, sometimes spoken of as sordes, or if we have a subgingival calculus, in every one of these cases we probably have a round-cell infiltration of these organs. So whenever we find a mouth with abnormal redness at the edges, we have such a case as Dr. Noyes showed us tonight. In probably eighty-five per cent. of the cases we have this. It is only those in whom the condition can stand the onset and the attack of all these bacteria in the system. I have always been of the opinion that the fact that we find bacteria in the tissue does not mean that we have infection in that tissue. We have pyogenic organisms, but that does not mean infection. We may take a tooth out and find pus-producing organisms, but unless we find evidence that we have infection there I would not like to say that that field is infected because we find the streptococcus, but if we find pus cells and leukocytes that have broken down, then we have infection.

I agree with Dr. Noyes that the importance of this question demands that we go to the people and try to educate them, and then go for the child. And so it gets back to the State and the city, and we must try to get them to care for the children. We cannot care for them at present, but we can if we try intelligently enough and get a proper institution in the State of Illinois and the City of Chicago, as they have in the States of New York and Massachusetts. We cannot do much unless we place in the State a Forsyth Institute. We should have one such in the State or city. Yet I think it important that we do dig out all the focal infection we can in every individual coming under observation, because if we can impress upon the parents that they have a disease which is the result of some chronic infection, then I believe they will be willing to pay the taxes in this State that their child and their neighbor's child will not have the infections following errors in prophylaxis. I think it is easier to educate the parent who has had the disease than to start on the child. I agree with Dr. Noyes that it is a problem of the whole

nation, and we as a State and city must do our part in solving it. In the meantime, whenever we find a tooth with infection, we should take off the root end and never assure the patient that we can eradicate that infection, because we cannot. The question of infection around the tooth I believe will not cause and has not caused as much trouble to the individual as the inflammations and infections that have been confined to the root end, because in eighty-five to ninety-five per cent. they have the infections about the gingivæ and they have gone over a long period of years. The by-products of the infection are not retained much, for they escape into the mouth and never pass into the system.

One question I would like to ask the essayist. If the area in which they seem to enter is just below or just above the line of attachment, would there be any value in cutting the tissues that far down? That is, would there be any value in removing that area in cases where there is any evidence of chronicity?

The slides he has shown us mean that he has studied for a period of twenty to twenty-five years, and that he has been able to draw this lesson because he has been studying these tissues over all these years, and when he told you that the tissues seem to cling to the enamel he meant just that; they do. He found this out himself, nobody told him about it, and one slide meant the studying of hundreds of slides and the life-work of the essayist.

**Dr. Truman W. Brophy.** I have only to say that it will be necessary to begin sooner than the school age of the child if we accomplish what we desire. It has been said, and often said, that if we can succeed in getting the State or municipality to appropriate funds enough to maintain a service in the public schools of our city and State for the care of the teeth of the children, we will have reached the end that we have so long desired; but we will not. That would be a most satisfactory achievement, but we are not beginning soon enough.

In reference to the question that Dr.

Reid asked as to the presence of caries in the teeth of the child seven years old, how often have you seen children two and three years old with the incisors and cuspids almost ruined by decay, especially the labial surfaces of the incisor teeth and the cuspids all broken down? If we are going to accomplish this work that we have been discussing it will be necessary to devise some plan by which the children can receive attention in their earlier childhood.

One thing occurred to me in the course of the evening when Dr. Noyes was exhibiting his plates and again during the discussion. This society can, I think, make itself most useful to the medical profession and the dental profession or the laity by preparing a monograph on this subject. In its early history this society prepared a monograph on the care of pulpless teeth and that monograph was a classic. It circulated throughout the country and received more favorable comment than anything the society has ever done. I am satisfied that if we could have a monograph prepared on this subject, if Dr. Noyes would do that, assisted as he might be by others, it would be a most excellent thing. I would like to leave that for your consideration, and if you think it desirable we will begin at once and before next Christmas the monograph will be prepared and published and distributed to the medical profession and the dental profession broadcast. All the questions such as these: What condition of a tooth demands its removal? Is it not the duty of the physician or dentist to eliminate disease and conserve normal tissue? Let them think of that. Then, How can we eliminate abnormal tissue? How can we conserve normal tissue? I think we can impress upon the profession more effectually by a joint paper from the society as to the demand for the removal of teeth and the conditions of the teeth which require their removal. I think we could make it more effective coming from a society like this than by the presentation of a paper by an individual alone. Of course, many of the teeth that have been removed in recent



years on the advice of medical men is nothing less than a tragedy. The full effect of the destruction of these teeth is going to be felt in generations yet to come.

I have nothing more to say than to leave this thought with you: The preparation of something which will impress upon the dentists the importance of preventing the exposure of dental pulps and the formation of darkened areas around the roots. If that can be done there will be no question but that there will be less teeth extracted than is now being done every day. It is the hope that we can do this and stop the misery that is being inflicted upon the advice of men who know but little of dental pathology. I have found it appalling to ask some intern in a hospital, "How much do you know about dental pathology and dental histology?" and find how little they know about it. I think we can surely do something along that line.

**Dr. Frederick B. Noyes** (closing the discussion). I will take just a minute to review a few of the things I wish to present, and will pass most of the discussion, for the hour is late.

I wanted to show that there are three ways in which the mouth may be the gateway of infection, and these represent three very definite methods of extension of pathologic conditions:

(1) In children the involvement of the submaxillary lymph glands is accomplished by continuity of tissue channels. The tubercular infection follows the natural anatomical course and the natural anatomical flow. That is one kind of gateway, one manner of pathologic extension.

(2) In the case of all those conditions which are most actively before our attention today in the cases of systemic infection from local foci about the roots of teeth, we have the pathologic agency of the micro-organisms which are causing the local destruction transported to other parts of the body by the blood stream. The infection which destroys the pulp and produces the pathologic reaction in the region of the apex by its

progress from the mouth cavity, down the root canal and into the apical region, acquires in the course of its progress a changed relation to oxygen tension which makes that micro-organism a menace to other parts of the body. The same micro-organism which produces the local disturbance becomes the cause of the other systemic involvement. This is a second means of spreading infection, a different kind of a gateway.

(3) In the local conditions which destroy the supporting tissues the pathologic agent which produces the local reaction is not itself the systemic menace. For instance, in the Igorote, although all his teeth were lost by the destruction of the supporting tissues and the teeth fell out, still the pathologic condition which produced the local reaction did not become systemic. In this case local reaction furnishes the opportunity for the entrance into the body of an entirely different pathologic organism, which destroys the life of the individual. This is a third kind of gateway.

Undoubtedly the conditions which exist in the tropical regions, where there are many exceedingly virulent tropical fevers, furnish an opening for the entrance of the germs that kill the patient by starting a new pathogenic process. If that is the case, how does it occur? There must be something in the local conditions produced by the local pathology which furnishes an opportunity for the entrance of these pathogenic organisms.

In our civilization we are not subject to as many diseases of that class as the tropical savage, but just think of the number there are even in our condition, and it does seem that in those local conditions are offered opportunities, gateways for infection, which must challenge our attention.

I believe that Dr. Logan struck a very vital and essential point in the treatment of those conditions when he advised the removal of the tissues involved in the local condition, so that it is possible, in the healing, for a normal epithelium to come in normal relation with the necks of the teeth and eliminate that



local reaction which furnished the gateway for infection.

Several of the speakers have spoken of the necessity for training in the home, and that is the keynote for the possibilities of the future. I want to emphasize the fact that the dentist comes in contact with only a very small number of individual homes. The only way in which we can reach all homes is to have the children take training back to the home from the school. When you teach every child in the school the children go home and tell the mothers just what they have been taught, and you at once

reach every family in the community. That is the way in which the teaching of oral hygiene will reach not only the families of our personal clientèle but every family in the community, and that is the only way they can all be reached. This is a great challenge to the dental profession.

**Dr. Brophy.** I wish to ask what the result has been after the infected root end has been removed. Does it clear up eventually?

**Dr. Noyes.** I have done no work in that connection and cannot say.

Adjourned.

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## Dental Society of the State of New York.

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Fifty-second Annual Meeting, held at Albany, N. Y., May 13, 14, and 15, 1920.

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(Continued from page 997.)

THURSDAY—*Morning Session.*

(Continued.)

Dr. D. W. McLEAN of Mt. Vernon then read the report of the Committee on Practice.

[This report is published in full at page 1089 of the present issue of the DENTAL COSMOS.]

### DISCUSSION.

**Dr. W. D. Tracy, New York City.** *Mr. President, ladies and gentlemen,*—The report of the Committee on Practice as submitted by the chairman, Dr. McLean, presents many phases of interest to the busy dentist of today.

In watching a good operator perform a difficult operation in a painstaking and skilful manner there is always a sense of satisfaction and of benefit to the on-looker. And for the same reason there is always pleasure and benefit derived from a visit to the office of a fellow

practitioner who is conducting a successful practice.

The occasions when the open-minded dentist fails to glean some useful knowledge from the scrutiny of offices other than his own are rare, and a series of calls upon successful dentists in different cities is really almost like a post-graduate course in office management.

The pictures shown upon the screen have made it possible for us to get a glimpse of office arrangement and office interiors which most of us would not have an opportunity to see for ourselves, and as a sort of a supplement to the report have proved of much interest and have materially added to its value.

While there are many points brought out in this report which the carping critic might term hackneyed, they are none the less apropos, and none the less valuable to those who will take heed.

We need now and then to call to mind the supplication of Robert Burns:

Oh wad some power the giftie gie us  
 To see oursel's as others see us!  
 It wad frae monie a blunder free us,  
 And foolish notion.

As there are but few who are always in the pink of condition, and as the report says, we may be forgiven for the cast of our countenance or for the color of our hair, but for negligence of the common laws of hygiene or for carelessness and shiftlessness in matters of dress and general cleanliness there is no forgiveness, or at least there should be none in the case of the dentist.

There has in the past been much "twaddle" concerning "dental salesmanship," so much of it in fact that it seems to have infected the minds of some of the younger generation of dentists. The result of this mental infection is that the operator when diagnosing his case gets a blurred or distorted picture. The dollar sign obstructs his view and the clear picture of the restored case is sometimes spoiled in the making, and the sense of satisfaction that comes to every professional man when a good service is well rendered may also be dulled by the too constant dwelling upon the prospective fee.

This comment is in no sense intended to belittle the importance of good business management in the dental office, because there is no room for argument concerning that matter, and anyone whose judgment is of value, professional men and laymen alike, realizes that in fairness to patient as well as to the dentist the office must be well run and well regulated from the business point of view. This does not mean, however, that the office should be commercialized.

The numerous recommendations in the report concerning office details, careful accounting, secretaries, office assistants, nurses, time-saving methods, psychology, quality of voice, tact, consideration for the comfort of patients, and all the other items that have been so completely brought together are not subject to discussion; the points made in connection with them are incontrovertible and are commended to your serious consideration. During the war the terms

thrift and economy were dinned into our ears till we became almost tired of them, but the professional man who is not on a friendly basis with both of these terms will sooner or later come to a day of reckoning which will make him regret that he did not take advantage of each fleeting month to lay aside something toward his reserve fund.

The report speaks in serious vein upon the menace of the malpractice suit, and it is well that every practitioner should take heed to what has been said. The man who goes on from year to year saying, "I have been practicing fifteen years and no one has ever brought suit against me yet," may find in his next morning's mail a notice that suit has been established against him, even though he may be guiltless and absolutely innocent of carelessness or lax procedure. And if the plaintiff has a shrewd lawyer who brings in enough expert witnesses, it may seem to the defendant that the blindfolding bandage we are used to seeing over the eyes of Justice has been tied over the eyes of the twelve good men and true!

There is much food for thought in this report of the Committee on Practice, and it will stand as a valuable contribution to the Society's literature.

**Dr. F. L. Stanton**, New York. Mr. Taylor, the famous efficiency expert, was once asked by a contractor whose men were shoveling dirt if the efficiency expert could be of any service in raising the efficiency of his organization. Mr. Taylor analyzed the situation by showing that each shovel was designed to lift thirty-eight pounds of dirt, and he computed that the men were shoveling so many cubic yards of dirt a day. By increasing the size of the shovel the efficiency of the gang was decreased. By lessening the load it increased. When the average shovel-load was twenty pounds, the efficiency was increased forty per cent.

I read a book which contended that you could not do very much work, or make money, if you did it with your hands, and as a result of that I have abandoned the practice of dentistry at



the chair, and am therefore probably an extreme case. I have not operated in five years, but have acted as a manager—an efficiency manager, I hope.

In the analysis of failures in business seventy-five per cent. are due to one cause, the lack of knowledge of what it costs to produce a given thing.

There are three things that enter into the manufacture of anything, the manufacture of an automobile or an aeroplane, or in dental practice: labor, material, and overhead. Overhead, or as the English call it, burden, is all that part of the expense of a dental practice that is not included in the salary list and the material list. In order that a business may be on a substantial basis it is absolutely essential, especially in times of stress, that the man who is conducting the business know what it costs to produce a given unit. In order to know that cost accounting has been introduced. I will show a few forms to show you how cost accounting is carried on in my own practice. I have brought up my reports and ledgers from the general accountants, and will be glad to show them to you on Saturday. They will show how gold is received, who handles it, what becomes of it as it goes into the laboratory, and how its cost is determined on the final sheet.

Some dentists are offended by the word "job." They do not think it is high-toned enough to be used by the profession, but as we are treating the subject from the standpoint of the general accountant, we are compelled to use his terms; and inasmuch as cost accounting has been used in factories, we must maintain that throughout our profession, although the term may offend some of us.

When a patient enters our office I have on my desk a card. If the last number was 1000, I enter this card as 1001. As the executive, I check off in the left-hand column the operations that are needed for this job.

This job card is carried through until the job is finished, and it is returned to the executive's desk. The operator who took the impression was H. The card

shows me that impressions were taken, and models made by M, etc.

I know at once the status of that job. In other offices these items would be entirely different, because they are interested in different phases of dentistry than I am. Each operator has a day sheet, and everything he does is noted.

This is the engineer's card, and you see the record. The executive can see exactly what he did. On the right hand side, the cost accounting clerk will see what the cost of his time is.

The accountant calculates the number of operating hours you have in your office, and divides that into the overhead, and that gives you the overhead per hour. At the present time, in my office, it is \$1.20 for each operator. General expense, that is, labor and operating expense, are exactly equal.

Next you have the material card. The only material that is of importance is precious metal. You are not interested in the cost of cotton or iodine. In a highly specialized shop like that of Henry Ford, he would have to keep account of all the different items, because he uses such a quantity, but in our offices, it would not be worth while.

There is a cost accounting sheet for every patient, and this one [illustrating] shows you how it works out. Here you have collected on one sheet all the items you saw on the job card. The cost accountant posts each day from the cards the various articles he collects from the workers.

In the report just read, the doctor said it was often difficult to know how the other man handles his practice. This case [illustrating] was sent to me from another dentist, and the patient had on orthodontic appliances. I was able to submit to the orthodontist the exact cost. I charged this patient one hundred per cent. above the cost, and you see you are able to make an exact fee on the cost-plus basis—the cost, plus whatever profit you want to charge.

I found the cost of operating a practice is fifty per cent. of the gross income. Some men get it as low as twenty-five per cent., and others go over that, but



in studying some large practices, I find it is about fifty per cent. at the present time.

**Dr. E. Hillyer**, Brooklyn. I would regret exceedingly if the impression went out on the reading of this report of Dr. McLean that the subject of ethics and economics is left out of the college curriculum. I know pretty well the curricula of perhaps the largest percentage of the colleges of this country, and I am positive that this is included. Possibly Dr. McLean may have meant the extent to which it is taught. I shall be very glad indeed, as this happens to appeal to me personally, to have Dr. McLean confer with me, and see how far I have gone; because I speak of this in justification of those men who are giving it serious consideration.

The chief thing in giving it to the prospective graduate, is to put it before him so he will appreciate what he is going to step into at once, and apply it later on in the development of what many of us have not developed to anything like the extent that has been indicated here.

Really, it is a two-sided or two-viewed subject. As far as the personal equation is concerned, I do not think there is any boy who is not impressed at the very beginning with many of the things that are indicated to him at the start, the matter of personal cleanliness and personality, notwithstanding the fact that many of us have a great deal to contend with. In fact, the very first lecture, the very first hour I ever meet any student, there is impressed upon him the one necessity for making his profession a profession, and not a source of income.

**Dr. H. Sheinman**, New York City. I do not want to stand here as a critic of Dr. McLean, but I would like to ask the chairman to get from the assembled members here an expression of opinion of the latter part of Dr. McLean's paper, from men who have been in practice five years or less. It has always been my feeling that a professional man should really enter a profession financially unembarrassed. I have the idea, and I feel that I am right, that most of us

have entered the profession without a financial backing, and when we start it is a hard road to travel. It is not until we reach a certain stage of income or our financial backing is established that we can have the things such as have been mentioned in Dr. McLean's paper.

Therefore I would like to hear an expression from men who have only been practicing about five years, who feel that they are sufficiently remunerated to do these things.

While I do not come within the five-year class, I am a little beyond that, if all Dr. McLean has told us concerning dental practice were carried out, to me it seems fees would be prohibitive in the majority of cases, and I would advise that our organization endeavor to establish much needed hospitals throughout the State, such as the medical profession has already done.

How can the young men feel themselves capable of conducting a practice in the fashion shown?

**Dr. H. W. Gillett**, New York City. I would like to qualify under that head! (Laughter.) I am young enough to remember just how I began. I looked around and found out the best methods available, and I came as near as I could to those methods, and I think that is what Dr. McLean means. It seems to me necessary that the young man should know what the successful men are doing, and to see what he can do toward living up to those principles in a modest way. If the man with a successful practice has an equipment of \$20,000, let the beginner start with \$200, if that is all he can command. Start with a kitchen chair, and a head-rest, if necessary; but live up to the methods expressed in the paper, and watch your business grow.

**Dr. Hughes**. I have been in practice a little less than five years. When I was out about one year I had the pleasure of visiting Dr. McLean's office. It impressed me as the most wonderful office I ever saw, for cleanliness, method, and everything else. When I returned to my office I resolved to have mine the same. I have progressed little by little, and while I have not an office anything

near like his, my object is to follow his methods as closely as I can.

**Dr. L. A. Timerman**, Fort Plain. This is from one who has practiced more than five years. I think the time is ripe for a postgraduate course in economics or business for all those who have practiced over five years. It strikes me the first five years of a man's practice is given up to squaring himself with the world. Then he is ready to invest a couple of hundred dollars, and knowing where to invest that is a very important matter. I speak from experience. I believe that some good method of teaching the young men how to invest and where to invest would be a capital idea. Dr. Hillyer made the statement that they are teaching it in every school. I know they are in many schools, but it is at a time when the young fellow cannot grasp it, he does not get the ideas they are trying to put before him. He must be out of college a while, and have experience, before he knows where and how to invest what money he has.

**Dr. McLean** (closing the discussion). I want to thank you for the tolerance and consideration with which you have received this report. In starting any discussion of business in dental practice one never knows just how big a scrap he will get into. Any discussion of business has been frowned upon in the past to a great extent, and with good reason, because any discussion of the business side of dental practice is likely to lead us into an exaggeration, for the time being, of the financial aspect of the operations we perform, and that is the last thing I would wish to encourage or to stand for.

I believe a man who inserts a gold inlay where an amalgam filling will give better service to the patient is not living up to the ideals of his profession; and I believe a man who will introduce a gold crown, especially in these days of enlightenment, where a filling will do better, is also acting unethically. He is taking an advantage that a business man will seldom take. In buying a suit of clothes a man is supposed to have some knowledge of the material. He feels its

texture and examines it, and has some knowledge of what he is buying. The patient has no judgment in the matter of the operation, but comes to you in trust. If a person likes your personality and has confidence in you, the trust is increased, and it is your duty to fulfill your moral obligation by giving the patient the best you can. But when the operation is performed I still maintain that if the dentist is going to do justice not only to the patient, but to himself and his dependents, he must know what it has cost him to perform that operation. He has to have a definite way of determining that, and must charge a fee which will enable him to do that operation not at a loss, but at a profit.

There are some equipments shown in these slides which are very expensive. I have some slides of the office of Dr. George Winter, the exodontist, of St. Louis. The equipment cost \$20,000. I also have the plans of the offices of Dr. Best of Minneapolis. He has a large part of a floor, and you will wonder whether or not you are looking at a banking business when you see the floor plans. The fact remains that some of these offices have been built up by attention to detail, by "delivering the goods," and by managing so that it takes the minimum time to produce the maximum profit. Not one of us, no matter how long he has been in practice, but can improve, and if we can get an idea here and there and turn it into service to ourselves and our patients better results will be obtained.

The prime factor in presenting this report is my firm belief that we will get better operations when men realize that they can do these operations without being philanthropists.

The meeting then adjourned to 2 P.M.

#### THURSDAY—*Afternoon Session.*

The president, Dr. Gould, called the meeting to order at 2.30 o'clock.

**Dr. H. L. WHEELER**, New York. *Mr. President and Fellow-members*,—It gives me great pleasure to announce to the



Dental Society of the State of New York that a scholarship which I have founded in the school of which my father and mother were graduates—Alfred University—will be open for competitive examination in this State, beginning this spring, and at my request the preference will be given to the sons or daughters of members of the New York State Dental Society, in good standing. Any member of this society who has a son or a daughter who is desirous of getting a college education will have the privilege of applying for this scholarship by writing to Dr. Booth C. Davis of Alfred University, at Alfred, N. Y. If there should be demand for two scholarships, I have a cousin who has also established a scholarship in memory of her father and mother, and I am quite sure I could arrange to make that scholarship also available for the son or daughter of a dentist.

Dr. ARTHUR W. SMITH read his report as Correspondent of the Society.

[This report is published in full at page 1097 of the present issue of the DENTAL COSMOS.]

#### DISCUSSION.

Dr. A. H. Stevenson, New York City. While your Correspondent has drawn some very logical conclusions from the material at hand, the Industrial Dental Clinic is involved in some problems that so reach to the very fundamentals of sociology that they cannot be disregarded. Whether they are conducted on a free service basis or small-fee basis is merely a matter of degree. Anything that savors of paternalism is justly resented by the self-respecting worker, and is an infringement upon personal privilege and independence. For this reason you cannot legislate individual health except where the ill health of one is a source of danger to the community. While it is generally accepted by the laity as well as by the employers of labor that dental efficiency increases industrial efficiency, there are limitations within which the efforts of the employer must be confined. The

workers of today, particularly the skilled and unskilled manual laborers, are financially well able to pay the fees of private practitioners. The rapid increase in the rate of compensation of these toilers places them in a class to which even luxuries are no longer denied. Many have acquired means so much above their needs that they are spending it with reckless abandon. By increasing instead of curtailing their hours of labor they could not only bring about a much-needed increase of production, but could further add to their income. It becomes, therefore, not a matter of charity but of enlightenment to direct these individuals to private dentists who could give them proper service.

The Industrial Dental Clinic should therefore be mainly educational and, if the employees are given periodic prophylactic treatments and instruction in oral hygiene, the general dental service could be performed elsewhere. I can conceive of isolated manufacturing or mining plants such as the Colorado Fuel & Iron Co. at Pueblo, Colo., giving all types of dental service, as their inaccessible location prevents their employees and families of the employees from securing dental service and makes them entirely dependent on the companies. The same does not apply to those plants located in urban communities and the companies accept a tremendous responsibility in operating dental clinics in these places.

Can *real* dental service, worthy of the name, be secured from dental operators in these clinics as they are at present conducted? Most of the operators are young and inexperienced and consider their position of a temporary nature. The very system of appointment and lack of prospects discourages the best effort. Unless all posts are carefully graded and well remunerated there is no incentive.

I would particularly emphasize the menace of dental diagnostic work as carried on in some industrial clinics where there is no fixed responsibility. The taking and interpreting of dental radiographs requires diagnostic ability limited to the experienced, and is too important



a phase of dental service to be performed at these clinics. It was to prevent irresponsible dental work that the law of New York State was amended forbidding corporations to practice dentistry, so in our zeal for public service we should not indorse a return to the old abuses.

Experience has shown what excellent results can be obtained by a preventive program where the clinic is confined to oral prophylactic and emergency treatment.

A well-regulated industrial clinic devoted to the purpose as stated above can, in addition to increasing the efficiency of the worker, become a forceful factor for health in a community. Such clinics deserve the heartiest support of every member of the dental profession.

**Dr. T. R. Cullen, Oswego.** It is with a good deal of temerity that I attempt to discuss this report, after listening to Dr. Stevenson, who has so carefully covered the subject. I do not feel quite capable of dissecting this report question by question, and I shall only speak very briefly upon one or two phases as they have occurred to me.

The first impression I got was that industrial dental dispensaries have come to stay. The almost unanimous opinion among employers as to the value of the health of the employee, as well as to his increased efficiency, is proof to my mind that it is a permanent institution.

It is to be regretted that so much stress is laid upon increased efficiency of the employee by the different employers, in regard to the value of these dispensaries. I fear they look too much upon the economic side of the question, rather than the good they are accomplishing for their employees and for future generations.

It may sound a bit socialistic, but I cannot get away from the idea that an employer owes more than a living wage to the employee. I fully appreciate that a sick man is not as efficient a worker, no matter what the cause of his trouble may be, as a man in good health; but it would sound much better if the health of the employee were put first, and efficiency second.

I realize that there are some dispensaries that are conducted from a purely unselfish and philanthropic standpoint; but judging from the answers of the manufacturers to these questions, I fear the majority are conducted for sordid business reasons.

One of the first industrial concerns to look after the mouth and teeth of the employee, and with which I came in direct contact, was the Diamond Match Co. Unfortunately they had a very selfish object. Up to within a few years in the manufacture of matches there was a phosphorus used that was distinctly poisonous. The mouth offered a fertile field for the entrance of this poison, and any abraded surface in the mouth was subject to phosphoric poison. To protect itself the company started a quarterly examination of the patients, and a dentist was engaged whose duty was to travel all over the country to examine the teeth of the employees. He marked upon the chart—and it was one of the first I ever saw—the cavities to be filled, the teeth to be extracted, etc. He also marked a time when the work was to be completed; at that date, the employee had to turn in the chart signed by a local dentist that the work was completed, and the mouth was in a good, healthy condition, or he could not go to work.

Several years ago a new type of phosphorus was discovered, eliminating the poisonous matter, and it was adopted by all of the match factories in this country. Almost immediately dental inspection in the match companies ceased.

The point I want to bring out is this: That since that quarterly examination of the match workers, at least in the city of Oswego, I do not suppose there are twenty-five per cent. of the employees of the Diamond Match Co. that give any sort of attention to their teeth. Is it appreciated?

Dr. Smith asks: "As a hypothetical question, would you consider abandoning your private practice, and taking a position as operator or director of an industrial dispensary, if the matter of salary were satisfactory?" In the an-

swers is one by Dr. Henshaw, who says: "Yes, if I were a younger man." That hits the nail on the head. The young men just out of college, filled with the enthusiasm that most of them have, working under proper direction and under a skilled operator can, in my mind, accomplish the greatest good.

Dr. Smith says: "It would keep them out of advertising offices," which I think is also a very good reason.

The suggestion of Dr. McLean that after abandoning a good practice the dentist might be "fired" is food for thought. We have been led to think the average corporation is soulless, and the dentist might awaken some morning to find that the day before the directors had decided to abandon the dental clinic, or had selected Dr. So-and-so to act in his place. Where would he be?

A point that impressed me is that the dentist is apt to lose his individuality, and become a cog in a machine.

Another point. Have we the moral right, after building up a practice of say ten to fifteen years, to desert patients, who, strange as it may seem, think you individually are the best dentist in the world and that no one else can look after them as you can, take up a position with a company, and forget our old patients?

There was just one little point in Dr. Smith's paper that impressed me as being very strange. He read a report from the Eastman Kodak Co., and I was shocked to learn that they did not have a dental dispensary, when the head of it, Mr. George Eastman, has done perhaps more good for oral hygiene than any citizen in America. Notwithstanding the difficulties they say they are attempting to overcome, I was astounded to find they had no dental dispensary, and I think Dr. Smith and the other Rochester men have something to explain.

**Dr. T. P. Hyatt, New York.** This is an exceedingly interesting subject, and at the same time I feel it is a very important one. If I offer my own views, I offer them only with the understanding that they are my opinions at the present

time, liable to change as the development of the work goes along.

I am very fond of the last speaker, and because I am so fond of him, and I know he likes me, he will not mind my disagreeing with him very decidedly on the question of looking at it from the opposite point of view of the business proposition. If we want to get away from paternalism—and everything that is being tried now either in the legislature or elsewhere, that will benefit the health of the individual, is looked upon as paternalism—we must look upon it from a purely business point of view.

Let me tell you of my experience at the Metropolitan Life Insurance Co. Many employees come to my office and object to being treated in the dental clinic. They do not wish to be considered charity patients, and tell me they can afford to pay and prefer to go to their own dentist. I at once assure them that there is no objection to their going to their own dentist. I wish, however, to correct a wrong impression they have, about being looked upon or considered charity patients.

I then explain to them that clean mouths are necessary for good health. That healthy and happy employees work better. Sick persons are rarely happy. To keep employees healthy and well is a common-sense business proposition, and has nothing of charity about it. I then ask when they last went to their dentist and nine times out of ten they have not been in four or five years.

In the large majority of cases the employee is then willing to come to the dental clinic and after that they continue to come.

We should look at this question strictly from the business point of view. The employer is not compelled, morally or legally to take care of any of the employees. The economic conditions in our country should be such that every employee is in receipt of sufficient funds and should be intelligent enough to take care of himself. Why should any company take up this work? Because it saves time, and clean mouths are a great factor in aiding persons to derive



more nourishment and nutrition from the food they eat.

The Metropolitan gives a free lunch to its employees because they know they are then getting good food, well cooked and properly prepared, and they look at it from a practical point of view. In this way can be eliminated the idea of paternalism or charity.

I regret exceedingly that as far as my experience goes, there are but few of the industrial dental clinics taking advantage of the wonderful opportunities they have of gathering statistics. We have been gathering them in the Metropolitan, with the result that after four years, without any suggestion on my part, the officers of the company made it a rule that all employees had to come twice a year and have a cleansing of the mouth, or go to their own dentist at their own expense and have an examination and cleansing twice a year.

As I said, I regret that more of the industrial clinics do not provide for the gathering of statistics. It is because we do provide them, that the medical men and the officers of the company know of the benefits the employees received from prophylactic treatments.

Another point: I feel, and I think most of you do, that dentistry at the present moment is in a position of great responsibility. We older men, with twenty or thirty years experience behind us, know what is needed for the patient. The young men may be far more skillful in technique in the mouth than I am, but I know, without any self-praise, that my experience of twenty-five years or more must count because I have seen the younger men hesitate as what to do where the thing to me was perfectly obvious, and this only comes from an experience of many years. I think it is essential in the establishment of any industrial dental clinics for large numbers of employees to have some one in charge who has had many years of experience.

There came to my attention a young man who graduated only a few years ago and who has been called upon to establish an industrial dental clinic for some 20,000 employees. He came to the

Metropolitan, and we did all we could for him. We are glad to help, and do help everybody we can; but what experience has he to diagnose a case, or advise, or sympathize with all of these persons who will come under his jurisdiction? Will he be able to gain the confidence of the company and get them to spend \$30,000 or \$40,000 that will be necessary to deal with the question in a satisfactory way? In spite of the very nice report that was read, there are many industrial dental clinics established like one I refer to. In one of the replies to questions sent to many industrial dental clinics there is one clinic with one dentist, and no assistant or dental hygienist and no clerk. He has given 1500 prophylactic treatments for 1500 patients, and extracted 780 teeth in one year, and has taken care of many emergency cases, besides putting in quite a number of fillings. According to this, he gave nine cleansings per day on an average, and what time is there left? How long does it take to put the patient in the chair—how long for the sterilization of the instrument—how long for the recording of the work? One can see at a glance that this is not the best way to gain results. That man, if he took care of the details, did not take care of the cleansing, and if he took care of the cleansing of the teeth, he did not have time to do the rest of the work, nor to think out and plan out the best methods to be followed. The officers will not be satisfied, and this work will lose much of its value. I hope the time will come when our profession will be interested in industrial clinics, and insist that they be instituted on a sound basis, and proper work done in a proper manner, with proper equipment and records.

**Dr. C. M. Dunne**, Norwich. The question of free dental service, or industrial service to the employees of the large companies, to my mind is the most important question that you gentlemen are confronting today. I agree heartily with Dr. Stevenson and also Dr. Cullen in many of their remarks. If labor were as easy to get today as it was ten years ago, we would not be planning for so



many clinics. Call it paternalism, or what you will—that is the real reason why they are doing these things. They are even feeding those people at a cost less than they can go across the street and buy the food. Why are they supplying their employees with groceries? Because they can get those groceries in large quantities cheaper than the people can get them, and they can hire those people cheaper by doing it, and make the people more satisfied with their concern than with the concern across the street. That is a fact, and you can call it what you wish.

Is it right for an organization rated at millions to compete with the dental profession? I call it pauperism; they pauperize their people in order that they do not have to pay quite as large a salary to their employees as they would if the employees went out and paid for those services in the legitimate channels of professional work. Those are things we must confront.

Dr. Hyatt is the best friend I ever had in the world, and I am not against the work, except in the way it is going to be done. This work is just in its infancy. If we are going to put our O. K. on it, all right; do so, and let us take our medicine. You will find a Dr. Hyatt once in a while, but rarely. Whether in competition or not, it would not make any difference with Dr. Hyatt, as far as his progressiveness is concerned; but of how many people of the dental or medical profession is that true? Competition is the life of trade, and you all know you work better because you are in competition with your brother dentist, you are doing modern work because your colleague is doing that kind of work, and you want to do it the same way or better. Is the dentist in the factory in competition? No. The exception proves the rule—when you have a man like Hyatt it is all right—but it is impossible to get the standard of work that a person could get from outside sources.

The aim of all this, I believe, is to improve the condition of the people of this country. Are the people in the factories poor, so they cannot afford to pay

for dentistry? Do we find poor teeth only in the factories, or only among poor children? Oh, no, you know we do not. It is the same with the rich, the middle class, and the poor. You find the superintendent of the plant and the man who cleans the furnaces with equally bad teeth. By giving those people that service we are not making for better dentistry. We are only passing over the condition that exists. We have not made that person a bit more responsible than he was before; we have not proven to that person that his teeth should be taken care of—we have taken care of them. Unless we resort to the type of work they did in Germany, unless we are going to make this country one big machine, and every dentist, every mechanic, every fireman, every superintendent, every dental nurse, a cog in that machine, we must get away from this work, because this is gradually going to be the case. Someone pulls the string, and every man must have his teeth examined at this hour, his eyes at another hour, etc.

I am in favor of educating the people and teaching them that God gave them their life, and that God gave them their children, and that it is their responsibility to take care of themselves and their children, not the State's, and not the organization's they are working for, nor the responsibility of the Red Cross, nor the philanthropic societies, nor the fraternal organizations. If we do not do that, we are planning and paving the way for the greatest social upheaval that this country has ever known. We may not live to see it, but the time will come when the people whose teeth you and the rest of the men are taking care of free of charge, when they go to another concern, will say: "The State should take care of our teeth; the State should do this for us and our children." You will have more socialists, because you are making them. The sociological principle of this is either right or wrong, and personally I believe it is wrong.

**Dr. Hyatt.** If the last speaker is right, we should abolish every public school in the State of New York. If it is right to train the minds of human

beings, it is right to train the bodies of human beings. As far as I am concerned, we have sent out into the dental world 100,000 cavities to be filled that would never have been filled, if we had not called their attention to it. We found a lot of dentists who are poor business men, who do not know enough to pick up a dollar when they see it. We have records in the First and Second Districts, in the examination of nearly 20,000 public school children, where the teachers have insisted upon the children going to a dentist to have the work done, and dentists have said the cavities were so small that they were not worth filling, but postponed it until another time. I believe Dr. Dunne is wrong.

**Dr. Twigg**, Ossining. Dr. Hyatt is making a colossal mistake, because the public school clinic is supported by every man's money, not by private funds. The public school says every man and woman who has children can send those children and have the same kind of care, whether they are tax-payers or rent-payers. That prevents destructive conditions, while the industrial clinic is a decidedly questionable element.

**Dr. Simon Berlin**, New York. I must personally congratulate the society that it has broken through that strictly professional shell, and has admitted such questions as pertain to sociology and economics as of importance enough to be discussed at a meeting of this kind. It is evident that this subject is very new to us. It is so evident because of the glaring misconceptions as to what is true sociology, which, in the last analysis, means that all social benefits should go to the largest majority of the people as a whole. It is evident from the remarks of the last speaker and of one of the previous speakers that primarily they appeal to you on the old mistaken conception that competition is the blood of our social life. It is a fallacy, and has been so proven over and over again by the very business methods that these corporations use, namely, the elimination of all competition in the production and distribution of commodities. The co-operative method is recognized now as

the most efficient method. The only psychology which enters in opposition to socialized dental service is a selfish one, and that is, that someone is afraid his own station in life as a dentist may suffer. And here is where I wish to touch upon the question of the State. Many of you are opposed to the State dealing with the question of health as it pertains to dentistry; you do not want a State paternalism; you are afraid of the word socialization, for it reminds you of socialism; but after all, from what you have heard this afternoon, you see that the corporations are not doing their social work enthusiastically or wholeheartedly. The dollar is the basis of all their activities and calculations. Does it pay? is the only question by which their actions are guided. We are coming to the time when the State will take over the control of the healing professions—and we are coming to it in spite of your opposition—when the State will consider it imperative that every individual shall be entitled to the right of making a living, and to the right of being healthy, and if the individual is ignorant of these primary rights, it is not the fault of the individual so much as that of the present state of society which keeps him in ignorance.

Where is the wrong of the State taking hold of the project? The objection that was raised against it by Dr. Stevenson, I believe, is the interference with personal privilege. The personal privilege of being sick? I believe it is much better that the individual should be robbed of that privilege, and be made healthy by the State in spite of his own objection. We have done that with the vaccines, when the individual objected. We have done that through compulsory health methods, and for the second time I am glad to be in accord with Dr. Hyatt. He seems to be ahead of us "younger" people, and is far beyond most of us in the clearness of his social vision.

The last speaker stated that the corporations pay for the expenditure on the dental work. As a matter of fact, they do not. They charge it to overhead expense, and you and I pay for it as



consumers of their products. Is there a difference to you as to how you pay for it, by direct taxation on necessities in life or by State taxation? Should a law be passed providing for State or municipal dental service, a provision could be inserted that the State Dental Society shall choose the heads of the different units and not leave it to the companies, who are ruled more by the question of expenditure than that of efficiency, nor can they be expected to know who is or who is not suitable for the position.

The subject is so vast and has so many ramifications that it is difficult to touch on all of them. Dr. Stevenson appealed to you almost pathetically that the workers are well able to pay the fees of the private practitioners. In today's program, an hour or two later, you will hear of root-canal work, where one root will take one to ten hours to fill. Every half-hour and every quarter of an hour is to bring in to the dentist the necessary amount of money so that he may earn a decent livelihood, which we are all entitled to. Multiply that time by the amount due for service and then see if the average worker can afford to pay for it. The big wages the workers received during the war was a flash in the pan, and after the war the worker made as little as he did before the war, taking the high cost of living into consideration, so that he is held down to the absolute minimum of a mere livelihood. Economically, the working man had to fall back, and it is absolutely beyond his ability to pay for decent dentistry. You have either to throw him to the haphazard dentist or make it possible for him to receive decent treatment and to have the work done well. Society will gain by it; we will eliminate that commercialism that is attributed to us; the patient will have full confidence in his dentist, sparing him the suspicion that he is not giving the best that is in him. Nor will the dentist be the loser by such a system. The guaranty of a decent and

comfortable living, the feeling of security that he and those that are dependent upon him will never suffer want, and the consciousness and satisfaction of a duty well performed will bring the happiness in which he unfortunately now is poor indeed.

**Dr. Stevenson.** I want to correct a misquotation from my discussion. I specified a certain type of worker. The last speaker did not quote me as I spoke.

**Dr. C. A. Thorne, Rochester.** We, in Rochester have a motto saying, "Do it for Rochester." One of the speakers is surprised that George Eastman wrote such a letter, but I think that has been amply answered by the discussion pro and con. Our George Eastman is a busy man and a business man. He is credited with very swift decisions. I imagine that the business part does not appeal to him now, and until we get it on better grounds, the matter will stand as it is.

**Dr. Dunne.** My idea is to educate people, not give them something. Time was when this country could do a lot of things it cannot do now. In Germany, the time was when every school child had his teeth properly filled before he could go to school. Every man was a part of a machine. The brightest man worked for perhaps a good deal smaller remuneration than the man who was not quite as intellectual; but he worked because the State told him to.

We cannot settle this proposition this afternoon, but I say to you now give me America and American ideas, as they have always gone through, and I shall be satisfied, and I want to keep away from everything that tends to make people believe that the State or the organization that a man is working for shall take care of him. I want those organizations to pay that man well enough so he can go out and have it done properly. I want the man educated, but the nearer we get to German ideas, the more I say "God help America." I am an American.

(To be continued.)



# THE DENTAL COSMOS

A MONTHLY RECORD OF DENTAL SCIENCE.

*Devoted to the Interests of the Profession.*

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EDWARD C. KIRK, D.D.S., Sc.D., LL.D., *Editor.*

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## EDITORIAL DEPARTMENT

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### The Public Demand *in re* Dental Education.

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AN observing philosopher once remarked that the pen of most dental writers had at one time or another tripped lightly over the pages to the tune of dental education. The fundamental importance of the subject and the widespread interest which is manifested therein would seem to warrant the foregoing statement and to justify the continued discussion of a problem the correct solution of which is of vital importance to the success and future welfare of the dental profession.

It is not our present purpose to consider details in the educational scheme, but rather to direct attention to certain broad principles which affect the scheme as a whole and which exert a determining effect upon the extent and character of the dental educational curriculum and its relation to the public need.

A generation ago the dental educational problem was compara-

tively simple for the reason that the dominating *motif* of dental practice was its manipulative constructive phase. Dentistry was a highly developed craftsmanship and the bulk of professional thought and ingenuity was focussed upon manipulative procedures in connection with which the materials at its command were wrought into ingeniously conceived and skilfully executed restorations of lost dental structures. The restoration of the damaged dental mechanism to functional usefulness was the controlling ideal and only so much of the elementary medical sciences were annexed to the dental curriculum as were deemed desirable and necessary to give dignity to the course and the support of collateral knowledge to those elements of the curriculum that were generally regarded by both teachers and students as "the practical dental branches." Indeed there was commonly made a broad distinction between the "practical" dental branches and the medical subjects of anatomy, chemistry, physiology and pathology, which latter group was regarded as "theoretical" and therefore of minor importance. By the average undergraduate the elementary medical subjects were regarded as stints to be worked out for the purpose of passing the examinations leading to the coveted degree and to be forgotten as quickly as possible when the real practice of dentistry was begun.

The outlook presented by the dental educational problem today is so altered in character as to strongly suggest that the changes which have taken place are little short of revolutionary. These changes are mainly (*a*) the entirely new point of view which has developed with reference to the scope of dental practice, (*b*) the enormously increased accumulation of data embraced within the field covered by modern dental practice, (*c*) recognition of the responsibility laid upon the dental profession by reason of its prophylactic features involving the relation of oral hygiene to the public health, all of which have developed the fact that the distinguishing difference between the dentistry of the past and the dentistry of the present is that the ideal of therapy rather than of craftsmanship has become the primary directing force of the latter.

An educational curriculum is in some respects analogous to a creed which is the crystallized expression of belief at a given period. It endures in its original form only so long as it is an

expression of the truth as revealed to the minds of men, but with fresh revelations it undergoes changes or becomes obsolete.

The revolutionary changes in dentistry arising from its changed ideals and enlarged scope have wrought corresponding changes in the dental curriculum, most striking of which are the lengthening of the course and the introduction of a long category of subjects made necessary by the tremendous increase of data related to dental science and art. The result is an overcrowding of the dental course, the internal pressure of which is so great as to have necessitated the official sanctioning of a pre-dental year of preparation before entrance upon the course for the dental degree, with indications that another pre-dental year will soon be demanded in order to fit the novitiate for professional practice.

Considering the fact that this extraordinary increase in the extent of educational preparation demanded for the attainment of the dental degree is a reflex of the development of dental science and art during the past two decades, we may well inquire as to what the situation will be with respect to dental educational requirements in the future if the present rate of development continues.

It seems evident that any further lengthening of the term of the course would be impracticable. There must come a point in time beyond which the ambitious student will decline to go in the matter of preparation for his lifework, a point which would in his belief unreasonably postpone the productive use of his educational equipment in achieving his objective of self-maintenance and the founding of a home for himself and family. Moreover the extension in time and overcrowding of the curriculum are factors which directly influence in an inhibiting way the total output of graduates from our dental schools. This creates a serious situation when considered in its relation to the public welfare.

Every indication points to the conclusion that more dentists are needed in order to meet the rapidly increasing demands for dental service not only in private practice, but upon the broad grounds of the public health. The oral hygiene propaganda has produced a general awakening to the indispensable character of dental service as a public health measure. No adequate provision has thus far been made to meet the demand thus created and which is daily growing more insistent. True, there has been legalized



the dental nurse or hygienist which is all very well as far as it goes, but it falls short of meeting the existing need. Nothing short of a greatly increased number of fully qualified dentists will meet the situation, and to produce the increase is a problem of qualification, *i.e.*, of education, and therefore it is the problem of the colleges as representing the educational interests of the dental profession.

It is to be hoped that those immediately interested in this vital question will awaken to a realization of the gravity of the existing situation. It is a problem that ought to be, indeed must be solved by the dental profession upon broad social economic lines, for there are not lacking very definite indications that by reason of the health relations involved, the problem may be attacked by *ex parte* interests and solved without regard to exclusively dental professional considerations.

We have at various times suggested a revision of the dental curriculum and its division of subject matter into two categories, one group to lead to a qualification equivalent to the English licentiate and the other a continuation of the first leading to the doctorate. This plan has been found to yield satisfactory results in medicine and should work equally well in dentistry. Surely it would seem possible to train a student with a high school preparation in three or four years of professional study to a degree of efficiency that would fairly qualify him to wisely and safely care for the dental and oral requirements of his practice. For qualification as a specialist, a researcher or a teacher the additional training should be demanded. At present the congested character of the curriculum is dangerously open to the criticism that it is more productive of mental indigestion than of intellectual attainment, and a revision of the system seems from all points of view to be urgently needed.

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#### Death of Dr. A. H. Stevenson.

WE regret to announce the sudden death of Dr. ALBERT H. STEVENSON of New York City, on July 29, 1920. An obituary notice will appear in our October issue.

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## BIBLIOGRAPHICAL

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THE MICROSCOPIC ANATOMY OF THE TEETH. By J. HOWARD MUMMERY, Sc.D. (Penna.), M.R.C.S., L.D.S. (Eng.). With 6 Plates and 243 Illustrations in the Text. London: Henry Frowde, Hodder and Houghton, Warwick Square, 1919.

For many years the author has been engaged in the study of the minute anatomy of the teeth of man and the lower animals. He has published in many journals the results of his observations associated therewith. It is deserving of merit that accounts of these various researches should have been collected and rescued from the scattering which occurs in connection with articles printed in ephemeral, or more or less ephemeral journals to appear in concrete and handy form. The book contains also excerpts from papers which originally were presented to the Royal Society of London and to the Royal Society of Medicine. Such then was the origin of this the latest contribution to the literature of dental histology—the author's first book, but not his first printed work.

Believing that for the future welfare of dentistry the use of the microscope must be taken up with greater zeal and affection than is at present observed, we think this book will do a good deal to popularize the subject of histology and bring it into closer relationship with office and classroom. A microscope is as important an equipment of the progressive dental surgeon as is a radiograph machine. Just now there is a faction, so

to speak, for radiography, with its somewhat prescribed spheres of interpretation and usefulness. Correct radiographic diagnosis has its fundamental principles based on anatomy and histology. Hence it follows that of the two, the optical rays of the microscopic lens are of infinitely greater value to the diagnostician than the X-rays, and a good microscopic section of the dental tissues than a roentgenogram. If this book helps to kindle an enthusiasm for the employment of the microscope with its boundless possibilities and value as a clinical instrument, it will not have appeared in vain.

We welcome it, therefore, for the foregoing reason, and also because it offers another viewpoint to the study of a subject which is really of paramount importance in these days.

Regarding the publication of this book in this light, it matters little if we cannot subscribe to all that is therein printed, if we are unable to agree to this or that interpretation of the appearances of minute anatomical structures, or to slavishly, uncritically, or unquestioningly follow and accept all the author's deductions and theorems.

Let the student obtain the book, familiarize himself with its contents, use it subsequently as a work of reference and he will be sure to catch some of the atmosphere which pervades it. It demonstrates in no mean manner the many uncertainties that exist in connection with the interpretation of histological appearances in terms of physiological phenomena. For we have here presented,

for instance, ultra-modern ideas of the structure of the enamel and its development, of the dentin and its formation, of the paths of conduction of nervous impulses as found in the teeth—a modernity and up-to-date vision on the part of the writer which is curiously mixed sometimes with a terminology which appears to be old-fashioned and out-of-date. Thus the writer clings to the word “prisms” when describing what Leon Williams, who still remains the leading authority in the world on the subject of the histology of this tissue, called, and correctly called, “rods.” Frequently the term “temporary teeth” occurs—surely quite inappropriate in a work on microscopic anatomy. “Cement” reminds one of glue!

Again, this general appearance of the very latest research and methods of preparation and staining of the dental tissues is not very profound; for, throughout, references to obsolete doctrines and statements which have been passed on from book to book by indiscriminating editors are found. As an instance, reference may be made to the remark that “Haversian canals are said to be occasionally seen in the cement of human teeth,” p. 292. This is so old and so obviously untrue that it should never have appeared in a book which professes to be so very far advanced in its learning and outlook. Further instances might be multiplied. The reason that this and similarly ancient observations should not have survived in these pages is that they tend to confuse, instead of to clarify, the mind of the reader. They add to the number of the uncertainties and ambiguities already alluded to.

It is evident that the author recognizes them, for he explains in the preface that “much remains obscure and there

are very many points which are still matters of controversy,” yet throughout the volume, criticisms of others’ work freely abound. From his *ex-cathedra* position, Howard Mummary gravely rebukes those who are unable to and do not accept some of his various postulates and deductions and so-called facts. It is extremely unusual to find in a scientific book of this character the strange mental attitude adopted by the writer. The reviewer cannot recall a modern parallel. Anatomy is an exact science; histology is nearly an exact science, but not altogether, as the following will show:

One author gives the contents of the Haversian canals in bone as so-and-so; another authority gives another and different version, omitting or adding elementary structures there which may or may not exist, but which are not depicted or decisively known to be present. The transverse markings of voluntary muscle fibers still form the subject of much controversy. But the open and broader mind does not condemn the other opinion as unscientific and untrustworthy.

Preceding the Preface and Introduction are two quotations the appropriateness of which we fail to grasp, which are distinctly unusual and out of place. Do they apply to the author or the reader, we wonder?

Eleven chapters and an index comprise the book, the subjects including: “Development of the Teeth in Mammalia,” “Enamel,” “Development and Calcification of the Enamel,” “The Dental Pulp,” “Dentin,” “Cement” (*sic*), “The Peridental Membrane,” “The Tooth Follicle and Its Corrections,” “Nasmyth’s Membrane,” “Reattachment of Teeth,” and “Horny Teeth.” Of these chapters, II



and III dealing with the enamel and occupying 150 pages of the book are the best. But it would be an easy matter to destructively criticize certain of its contents. In the chemical analysis of this tissue given on p. 47 the old misstatement of fact is still perpetuated, and we are astonished to find that enamel contains more than three per cent. of cartilage and one-fifth per cent. of fat! Enamel is a calcified secretion, and once fully formed has no organic content whatsoever.

In the chapter on the "Dental Pulp," we have the latest phase of the author's work regarding nerve endings, his position being rendered remarkably clear by the aid of a diagram on p. 221.

We will make no comment except to say that we totally disagree with the author who has confused connective tissue fibers and cells with nervous elements, and to record the opinion of the highest authority on histology in the United States, who has definitely stated that "the end cells" are certainly not nervous cells, but are probably connective-tissue elements. Figures 110 and 111 should have cautioned him (the author) as to their real nature; and to quote from p. 220:

"The mode of distribution of the nerves of the pulp above described appears to be peculiar to the teeth, as such a mode of termination of sensory fibers in 'end cells' is *not met with in other organs*. It would appear to show the in-

terposition of a peripheral sensory neuron (*sic*) in the course of the distribution of a sensory nerve, a *condition not seen elsewhere in the body*. . . . In the excavation of a carious tooth, although *little pain* is felt on removal of the superficial layers, when the *lowest layer is raised from the healthy dentin beneath, the pain is acute*." (Reviewer's italics.)

We can ascribe probably the evolution of the trend of thought underlying the teachings of this book to the influence of Von Stuer, Von Beust, Morgenstein, Römer, Fritsch, Leduc, Traube, etc. Like a fisherman at sea the author has cast forth his net far and wide and drawn into it many fishes, some small, some large. These he has prepared, flavored and served as a varied meal for the delectation of the reader, who, however, must avoid the assimilation of the smaller, immature, and unacceptable fry to satisfy his mental hunger by the digestion of the larger and more trusty members of the species.

The illustrations on the whole are very good. Some are extremely poor, notably Figs. 128, 125, 202, 184; some brilliant, as Figs. 15, 21, 181.

The book can be recommended as a work of reference to the dental practitioner; it is unsuited, on account of its obscurity of style and statement, to the requirements of the dental student.

A. H.-S.

# PRACTICAL HINTS

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This Department specially welcomes the brief presentation by our readers of any novel suggestions or methods which in their own practice have proved to be time-saving or to possess other features of advantage.

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## How to Make a Perfect Stone Model.

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By L. BALTER, Bronx, N. Y.

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IN order to obtain good results give your impression a coat of shellac, and let it dry for one hour; then give it a coating of any oil (3 in 1 is good). Then wash it off a little with cold water, let it stand for fifteen minutes. Mix

the stone compound as thick as putty and pack it into the impression.

*Do not move it around, as it will become porous.*

963 PROSPECT AVE.

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## A Case of Systemic Infection of Pyorrheal Origin.

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By A. S. ROCHLIN, D.D.S., Peekskill, N. Y.

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THE patient, a man thirty-four years of age, usually in excellent health, was taken suddenly ill on April 17th, becoming entirely unable to work, and exhibiting symptoms which the physician diagnosed as being those of sleeping sickness. The patient felt drowsy and listless; his digestion became greatly impaired and he complained of constant shooting pains in the head and around the eyes. A marked swelling developed below the left eye. He grew gradually worse, suffering from insomnia and losing weight (a loss of no less than nine pounds in one week), without respond-

ing to any treatment administered by the physician.

As a last resort he came to me, on April 23d, to ascertain whether by any possibility the cause of his trouble was traceable to his teeth. Examination disclosed a case of pyorrhea in the second stage, salivary calculus, and deposits on the roots being present in large amounts. Only a few of the teeth were free from pyorrheal pockets, and a considerable quantity of pus was found in the pockets around the six lower anterior teeth.

Treatment was instituted at once, consisting of thorough, careful scaling and

the use of disinfecting and tissue regenerating agents. The patient was instructed in the proper methods of oral hygiene, and requested to return for further treatment in three days.

On April 26th, the patient returned, stating that he felt perfectly well and that he had resumed his business as usual. His weight began to increase im-

mediately after treatment was commenced; his digestion improved, and the insomnia left him entirely. The swelling under the left eye had practically disappeared and his headaches had not returned. The condition in the mouth was also found to have been greatly improved.

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## The Use of Rubber Dam Napkins and Cotton Rolls.

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By T. TANAKA, D.D.S., San Francisco, Calif.

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THE rubber dam napkins may be used more efficiently as saliva absorbents in the mouth than as "absorbent pads used between the rubber dam and the face."

The napkin should be cut into two pieces at the middle, one piece serving to keep the cavity dry for each operation. The napkin should be put in the mouth and placed against the cheek so as to cover up the opening of the Stenson's duct and the protruding portion turned over the corner of the mouth. In operating on upper molars and bicuspid's a cotton roll may be placed horizontally between the napkin and the teeth, and for lowers cotton rolls should be used in horizontal position (placed buccally and lingually) and Egger's Automaton used to hold them in position. The saliva ejector should be used always. In working on children's molars the napkins should be cut into three pieces and applied as already described. Napkins used in conjunction with cotton rolls are always serviceable where rub-

ber dams cannot be applied on posterior teeth.

In passing, let me remark that when the saliva ejector is working well there is no need of applying the napkins as absorbent pads between the rubber dam and the face.

In the "Practical Hints Department" of the DENTAL COSMOS for April 1920 in the article entitled "The Use of Cotton Rolls," the use of three-inch cotton rolls placed perpendicularly in the mouth against the cheek for operating on lower molars is advocated. Although the saliva ejector is used I see a danger of the cavity being flooded by saliva from the parotid gland and by movement of the tongue. Egger's Automaton for holding the tongue down and for holding the cotton rolls in horizontal position is indispensable in these cases.

How does the writer manage to obtain "a perfectly dry field" by his ingenious method?

1530 Post st.

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# REVIEW OF CURRENT DENTAL LITERATURE

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[*Pacific Dental Gazette*, January 1920.]

## **Mending Broken Plaster Casts.** BY JAMES A. MOAG.

This is a mere note that the author has found pyrolylin cement best for this purpose. It is waterproof, is made of a soluble cotton base, and holds together perfectly the severed edges of the broken plaster casts.

[*Schweizerische Vierteljahrsschrift für Zahnheilkunde*, 1919, Bd. 29, No. 3.]

## **Anodontia.** BY LEO VON MOOS.

This is a very complete report of a case (cf. Goeckermann and Strandberg) of congenital ectodermal defect in a boy of ten years. Deciduous and permanent teeth had never been formed. The skin is embryonal in character, without sweat or sebaceous glands or follicles. The facial topography was that emphasized by Goeckermann (flattened bridge of the nose). No peculiarity was recognized in the internal organs, but a congenital general weakness was evident. Mentally the child was subnormal. No evidence which might give a clue as to cause of this anomaly was found; particularly no evidence that it was of a hereditary nature. Von Moos gives reference to a number of analogous cases, unknown to Goeckermann.

[*Lancet*, May 8, 1920.]

## **The Pellagra Outbreak in Egypt (Associated with Parotitis).** BY J. I. ENRIGHT.

Afebrile parotitis was relatively common among the pellagrins studied. In some both parotids were enlarged, subsiding in about fourteen days, while in others suppuration occurred with discharge of pus containing a staphylococcus. Orchitis was not observed. Enright is strongly inclined to regard the parotitis as due in some way to a food deficiency (i.e. a part of the symptom-complex of pellagra). Thrush-like patches in the mouth were at times present.

[*Journal of the American Medical Association*, May 8, 1920.]

## **Treatment of Malignant Tumors of the Antrum.** BY G. B. NEW.

This report is based on thirty-three cases, eighteen of which were treated by cautery (soldering iron) and radium. The earliest symptom is usually pain, dull and frequently referred to the teeth. The operative mortality was nil. Three of the patients are dead, two have extensive recurrences, and ten are well and have had no recurrences over a period of from eight to twenty-eight months.

[*California State Journal of Medicine*, November 1919.]

## **Possible Relationship of Dental Abscesses to Toxemias of Pregnancy.** BY F. M. LOOMIS.

A brief history of eight patients, with symptoms of toxemia of pregnancy, in whom oral infection was present. In only three of these (Cases 1, 4, and 8) was improvement closely associated in time with the removal of the oral infection.

[*American Journal of Obstetrics*, December 1919, Vol. 78, pp. 803, 889.]

## **Various Cases of Pregnancy Toxemia.** BY GEORGE CLARK MOSHER.

In view of the relation of focal infection to eclampsia and pre-eclampsic toxemia, great stress should be placed on locating all foci of possible infection. The teeth especially should be examined. To avoid the severe auto-vaccination resulting from the removal of infected teeth, they should be extracted one at a time.

[*Bulletin de l'Académie de Médecin*, 1919, No. 39.]

## **A Specific Treatment for Vincent's Angina.** BY CAPITAN.

This study is upon 212 cases of Vincent's angina. Two hundred cases have been treated

and cured by this method within three to four days. Six (6) cubic centimeters of Fouard's colloidal arsenic is intramuscularly injected into the buttock. Local treatment is unnecessary. Usually injection is enough. Occasionally the fusiform bacilli and the spirochætæ persist longer than forty-eight hours, in which case a second injection of six cubic centimeters is to be given. Never

more than a second treatment is needed to clear up the Vincent's organisms, although other micro-organisms may survive and complicate the condition. In such cases, it is advisable, forty hours after the first injection (or even after the second), to make two or three small injections of three to four cubic centimeters each, at intervals of forty-eight hours.

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## OBITUARY

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### Dr. Jesse C. Green.

[SEE FRONTISPIECE.]

DIED, July 26, 1920, at his home in West Chester, Pa., in his one hundred and third year, from the effects of an accidental fall, JESSE C. GREEN, D.D.S.

Dr. Green was born on a farm in Birmingham township, Delaware County, Pa., December 13, 1817, of Quaker parentage, and throughout his life has been a consistent member of the Society of Friends. After the completion of his elementary education, in 1836 he became a school teacher at the Friends' School in West Chester. His tastes and mental tendencies directed his attention to the healing art, and for a time he was undecided as to medicine or dentistry as his life-work. Possessed of strong predilections toward mechanical handicraft, he finally decided to select dentistry for his major life-activity, and accordingly began its study with Dr. Mahlon Gallagher of West Chester as his preceptor. In 1843 Dr. Green purchased the practice of his preceptor, which he actively continued without interruption until his retirement in 1900—a period of sixty-six years. The honorary degree of D.D.S. was conferred upon him by the Pennsylvania College of Dental Surgery in 1865.

The span of Dr. Green's active professional life covers practically the period of the whole professional development of this department of the art of healing. He began his studies in dentistry about the time of the establishment of the first fundamental factors of our profes-

sional organization. The act incorporating the Baltimore College of Dental Surgery, the first dental educational institution in the world, was passed by the Legislature of Maryland March 9, 1840, and its first class, consisting of Robert Arthur and Covington R. Mackall, was graduated February 1, 1841. The first number of the *American Journal of Dental Science*, the first dental periodical in the world, was issued June 1, 1839, and the American Society of Dental Surgeons, the first national dental association in the world, was organized in New York August 18, 1840.

Not only was Dr. Green's entrance into the dental profession cotemporaneous with these epoch-making events in our history, but he has been an active and interested participant in all of its subsequent evolution. To the majority of those now living, the series of events that in their totality constitute the history of dentistry are known only as they have been recorded, or by tradition; to Dr. Green they were matters of personal experience, and to hear from the lips of this man of phenomenally tenacious memory the recital of the many activities and incidents pertaining to the formative period of professional dentistry in which he was personally concerned was indeed a remarkable experience.

His point of view with relation to the development of dentistry was not, however, the only or indeed the most striking feature of his unique life experience. His own history covers the period of most intense evolutionary development of the human race. All of the



great achievements of civilization have been accomplished within his knowledge. Steam navigation, the telegraph, all the devices that make for the rapid intercommunication of peoples and hence for civilization, the conquest of the air, the industrialization of humanity, have all taken place within this man's lifetime.

The dental profession throughout the United States recognized the centenary of Dr. Green as an important as well as an unusual event, and besides making him the recipient of numberless letters of congratulation and appreciation, the Chester and Delaware County Dental Society gave him a testimonial banquet at which he was the honored guest and center of interest. He was also the guest of honor at the annual banquet of the Chester County Historical Society on the night of his one-hundredth birthday anniversary, on which occasion he made an interesting and vivacious after-dinner talk, showing no signs of fatigue or physical weakness notwithstanding the fact that the same morning he had addressed an audience of upward of one thousand of his townsfolk and the entire day had been given over to receiving the congratulations of his friends.

His good health and longevity he owed to the philosophic calm and cheerful optimism which were his temperamental characteristics. As he has been heard to phrase it, Dr. Green "shed trouble." He never used stimulants, and was an indefatigable worker. The youthfulness of his spirit was perennial; his outlook on life was always optimistic. He was an incontrovertible material demonstration of the axiom that life is good. Since 1857 he kept an accurate and uninterrupted daily record of the meteorological conditions in his locality, his records antedating those of the Government signal service, and they are now copied in the archives of that bureau. He was a skilled technician, having made anemometers and rain-gages of his own design for use in his weather observations. He has found time also to construct several fine microscopes, and tradition "hath it" that no better trout rod has ever been constructed than those made by Dr. Green.

In the formative period of what we now

know as modern dentistry Dr. Green took an active part. He signed the call for the organization meeting of the American Dental Association and the Pennsylvania State Dental Society and was a charter member of both organizations, serving the latter in various capacities and as President in 1883.

At the passage of the first Dental Law for the State of Pennsylvania in 1876, he was elected Secretary of the Board of Dental Examiners, created by the law, and served the Board continuously as its Secretary until 1898, a short time before his retirement from active practice.

He was as actively interested in the civic welfare of the community in which he lived, being an honored member of the Chester County Historical Society, Treasurer of the West Chester Fire Company for seventy-six years, and a lifelong member of the Society of Friends and attending the meetings regularly until the time of his death.

Dr. Green is survived by one son, William H. Green of West Chester.

The funeral services were conducted from his home July 28th, by the Society of Friends. His remains were interred in Oakland Cemetery, West Chester.

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### Mr. John Wesley Hyatt.

DIED, May 10, 1920, at his home in Short Hills, N. J., at the age of eighty-three years. Mr. JOHN WESLEY HYATT, the inventor of celluloid.

Mr. Hyatt was born in Starkey, N. Y., in 1837. As a youth he went to Illinois and became a printer. His career as an inventor began about 1861, one of his most notable inventions being that of celluloid, which was used quite extensively in dentistry as the base for artificial dentures previous to the perfection of vulcanite for this purpose.

Mr. Hyatt was one of the pioneers in the development of American industrialism and his name occupies a high place in the annals of industrial and scientific progress. The widely advertised roller bearing that carries his name is one of the numerous products of his inventive genius.



# ARMY AND NAVY DENTAL NEWS

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## Army Dental Corps.

### *Examinations for Army Dental Corps.*

Nothing has yet been heard from the examination of the first lieutenants of the Army Dental Corps who, having served the required period in that grade, are entitled to advancement to captain. The papers are still before the War Department. It will be some time before anything is heard from the examination of members of the emergency commissioned list who served in the dental corps during the war and who are seeking permanent commissions in the dental corps. Some 300 candidates were examined to fill 102 vacancies that exist. A movement is on foot to revise the field dental equipment, it being considered that certain improvements may be made in the direction of greater compactness in the

arrangement of the material and so overcome the difficulties of transportation and at the same time facilitate the work and contribute to the convenience of officers of the dental corps in the field.—*Army and Navy Register.*

### **Assignments.**

#### **Army Dental Corps.**

*Week ending July 10th.*

Col. George L. Mason from duties at Camp Dix, N. J., to San Francisco, Calif., and about August 5th to Hawaiian Department for duty.

Cpts. Max Wassman, Jr., John L. Smeltzer, honorably discharged.

*Week ending July 17th.*

1st-Lieut. William Stranathan, honorably discharged.

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## DENTAL LEGISLATION ETC.

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### Corporation Cannot Practice Dentistry.

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HARRISBURG, PA., July 16.

ATTORNEY-GENERAL SCHAFER has officially advised Governor Sprout not to issue letters patent or a charter to a corporation to practice dentistry. He holds the right to practice is regulated by act of assembly and is in the nature of a license from the State. "It cannot be sold, assigned or inherited, but must be earned by hard study and good conduct," says he. "It is not a lawful business except for persons who have complied with all the conditions required by statute. The practice of dentistry is not a business open to all, but a personal right, limited to persons of good moral character with special qualifications ascertained and certified after a long course of study and a thorough examination by the Board of Dental Examiners. . . . It is impossible for a corporation to be examined as to its fitness to practice dentistry. It cannot secure a license so to practice. As these conditions cannot be performed by a corporation it follows that the practice of dentistry by it is an unlawful business for a corporation to engage in."

As to a charter of this character reported issued some years ago, the Attorney-General holds the Act of 1915 would forbid it now.—*Public Press.*

# DENTAL COLLEGE COMMENCEMENTS

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## Creighton University, College of Dentistry.

At the annual commencement exercises of the College of Dentistry of Creighton University, held in Omaha, Nebr., the degree of Doctor of Dental Surgery was conferred on the following graduates:

Edward J. Cogan

James P. Connolly

Michael Healy

## Medical College of Virginia, School of Dentistry.

At the annual commencement exercises of the School of Dentistry of the Medical College of Virginia, held in Richmond, Va., the degree of Doctor of Dental Surgery was conferred on the following graduates:

R. N. Lanier ..... Virginia  
 W. P. Lewis ..... Virginia

W. G. Palmer ..... Virginia  
 J. L. Shepherd ..... Virginia

## Tufts College Dental School.

At the annual commencement exercises of Tufts College Dental School, held in Boston, Mass., the degree of Doctor of Dental Medicine was conferred on the following graduates:

Sydney B. Altman  
 Russell H. Bethell  
 Percival F. Butler

John A. Cleary  
 William F. Cleary  
 William F. Donahue

James H. Grimes  
 Thomas H. King  
 Paul Lounsbury, Jr.

Francis J. Marrs  
 Albert C. Sanders, Jr.  
 Charles E. Stewart

## University of Maryland, School of Dentistry.

At the annual commencement exercises of the School of Dentistry of the University of Maryland, held in Baltimore, Md., the degree of Doctor of Dental Surgery was conferred on the following graduates:

Moses H. Chaseman  
 Edwin P. Coolbaugh  
 Jos. Gitlin

Robert C. Johnson  
 Morris Kalmus  
 Walter C. Kylander

Abram M. Maimon  
 Mario Masses  
 Edw. C. Morin

Henry E. Nixon  
 Hal Preston  
 Michael E. Wilkes

## Harvard University Dental School.

At the annual commencement exercises of Harvard University Dental School, held in Boston, Mass., the degree of Doctor of Dental Medicine was conferred on the following graduates:

Barnet Bresnick  
 Herbert J. Burkinshaw  
 Walter E. Coe  
 Raeburn R. Davenport

Oskar F. L. Eriksson  
 Michael Ettelson  
 George A. Harris  
 Walter J. Hawkins

Hans Herzog  
 Taiji Mashihara  
 Fred G. Rollins  
 William M. Scott

Laurence H. Stone  
 Martin Tekmejian  
 Emil E. Tellone  
 Julian E. Treecartin

### College of Physicians and Surgeons.

THE twenty-fourth annual commencement exercises of the College of Physicians and Surgeons of San Francisco were held on Thursday, June 17, 1920.

The degree of Doctor of Dental Surgery was conferred on the following graduates:

Alberto S. Amaya	Ira E. Charmak	Harold J. Heitmann	Daniel J. Sullivan
Walter E. Anderson	Louis A. Di Nola	Jose N. Lerma	Albert J. Whitfield
John D. Atkinson	Anthony Gonsalves	Bradford Levin	Olin M. Wilson
Albert O. Carlson	Oliver W. Harris	Edward H. Ohlemutz	Harry S. Wittkopp

### University of Southern California, College of Dentistry.

At the annual commencement exercises of the College of Dentistry of the University of Southern California, held in Los Angeles, Cal., the degree of Doctor of Dental Surgery was conferred on the following graduates:

Avedian M. Alexander	Thomas P. Freer	John C. Moodey	William R. Smith
Julius V. Andrews	Carlisle Goggin	Orvl J. Nordeen	Robert E. Striegel
Milton F. Barr	Phillips Hardy	Kenneth C. Olds	Dora B. Tanner
Frederick W. Colgan	Shokichi Kato	Edgar A. Petty	Walter G. Travis
John T. Connelly	Dixon A. McNaughton	Daniel A. Rainboldt	Willis A. Walton

### Ohio College of Dental Surgery.

At the annual commencement exercises of the Ohio College of Dental Surgery, held in Cincinnati, Ohio., the degree of Doctor of Dental Surgery was conferred on the following graduates:

Ira T. Couples	.....Ohio	Otto P. Oppenheimer	.....Kentucky
Geraldine M. L. Courtright	.....Ohio	Tomojiro Sato	.....Japan
Raymond B. Daugherty	.....West Virginia	Joseph M. Siquel	.....New York
Neil C. Farrell	.....North Dakota	Anderson C. Smith	.....West Virginia
Arthur C. Gewert	.....Ohio	Bruce L. Stocking	.....Michigan
Floyd W. Long	.....Ohio	Joseph A. Tucker	.....Pennsylvania
James R. McAtee	.....Illinois	Rafael S. Villiers	.....Porto Rico
Harry A. Meranda	.....Missouri	Lloyd W. Walstrom	.....North Dakota
LeRoy S. Montague	.....West Virginia	H. L. Welch	.....Ohio

### University of Michigan, College of Dental Surgery.

At the annual commencement exercises of the College of Dental Surgery of the University of Michigan, held in Ann Arbor, Mich., on June 24, 1920, the degree of Doctor of Dental Surgery was conferred on the following graduates:

Hyman Baskin	Elmer R. Drevdahl	Lloyd R. Hirth	George B. Riker
Louis Braun	Marcus W. Frost	Herman S. Horn	O. D. J. van Schalkwink
Stanley C. Brown	James D. Glerum	Arnold J. Labbe	Nicholas O. Scheidler
Kegham Q. Chutjian	James D. Glover	Curtis C. Later	Paul F. Siegel
Clarence J. Clemo	William Gordon	Oscar H. Lubke	Harry C. Vorys
Ernest E. Cody	Benjamin M. Grosse	Harry T. McMahon	Omer C. Williams
Mildred W. Dickerson	Harold B. Hinchman	Ralph W. Reese	

The following persons, having completed their course of study, were graduated between January and June 1920:

Frank A. Gorman	John L. Knapman	William H. Moir	David Seligson
Stewart C. Hueston	Robert S. Kuehn	William B. Morden	Harry D. Smith
Victor R. Kaufman	Frank W. Mercer		



# SOCIETY NOTES AND ANNOUNCEMENTS

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NOTICES should reach the Office of the DENTAL COSMOS *not later* than the 11th or 12th of the month preceding that of publication.

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## Susquehanna Dental Association of Pennsylvania.

THE fifty-seventh annual meeting of the Susquehanna Dental Association will be held at the Hotel Sterling, Wilkes-Barre, Pa., October 26, 27, and 28, 1920.

FULLER L. DAVENPORT, *Ch'mn Ex. Committee*,  
520 Miners Bank Bldg., Wilkes-Barre, Pa.

GEORGE C. KNOX, *Recording Sec'y*,  
Middletown, N. Y.

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## National Anesthesia Research Committee.

THE annual convention of the National Anesthesia Research Committee will be held in Pittsburgh, Pa., the week of October 4th, in conjunction with that of the Interstate Anesthetists' Association and the Pennsylvania Medical Society. Prizes aggregating \$200 are offered by the society for the best papers on original research in anesthesia, such papers to be read at the annual meeting. This offer is open to all surgical, medical, and dental students and practitioners in the United States.

F. H. McMECHAN, M.D., *Chairman*,  
Avon Lake, Ohio.

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## Connecticut Dental Commission.

THE Dental Commissioners of Connecticut will meet at Hartford, Conn., November 18, 19, and 20, 1920, to examine applicants for license to practice dentistry, to examine dental hygienists to practice, and to transact any other business proper to come before them.

For further information address

ROBERT H. W. STRANG, *Recorder*,  
886 Main st., Bridgeport, Conn.

## State of Idaho Bureau of License.

THE next examination for dentists will be held in Boise, Idaho, on January 11, 1921. For application blank and law pertaining to this profession address Bureau of License, Boise, Idaho.

PAUL DAVIS, *Director Bureau of License*,  
Boise, Idaho.

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## Southern Academy of Prophylaxis and Pyorrhea.

THIS new society was organized in Atlanta, Ga., June 12, 1920. The charter membership consists of prominent dentists interested in preventive dentistry from several Southern States. Dr. J. R. Mitchell of Atlanta was elected president; Dr. Robin Adair of Atlanta was elected secretary. The proposed constitution and by-laws will be presented for adoption at the next meeting.

Nine Atlanta men were elected as a permanent organization and program committee. A feature of this new society is that they will have meetings as often as an attractive program can be arranged.

The second meeting was held June 26, 1920, the guest being Dr. T. P. Hyatt of New York. The morning session was given to his clinic, "The Filling of First and Second Molars in Teeth Having no Cavities."

In the evening a dinner was tendered the guest at the Capital City Club, after which Dr. Hyatt read his paper.

Membership in the society is limited to those who give at least half of their time to the practice of prophylaxis and treatment of pyorrhea, and will be by invitation.

ROBIN ADAIR, *Sec'y*,  
804-5-6-7 Atlanta Nat. B'k Bldg., Atlanta, Ga.

# UNITED STATES PATENTS

## PERTAINING TO OR APPLICABLE TO DENTISTRY

ISSUED DURING JULY 1920.

### *July 6.*

- No. 1,345,433, to LOUIS COOPERMAN. Crown articulator.
- No. 1,345,549, to HARRY P. RAWSON. Dental appliance.
- No. 1,345,579, to IRA A. BURNETT. Moistening attachment for dental engine handpieces.
- No. 1,345,595, to DAVID S. HIGHKIN. Dental bridge work.
- No. 1,345,606, to JAMES P. LEONARD. Dental appliance.
- No. 1,345,718, to CHESTER J. UNDERWOOD. Dental mirror.
- No. 1,345,815, to LOUIS J. WEINSTEIN. Paralleling device.
- No. 1,345,939, to CONVERSE W. LLOYD. Folding toothbrush.
- No. 132,880, to ALEXANDER A. ANZELL. Trade-mark for certain named dental and surgical mirrors, headmirrors, laryngeal mirrors, and retinoscopes.
- No. 132,899, to A. BOURJOIS AND CO. Trade-mark for tooth, nail, hair, bath, and face brushes.
- No. 132,990, to MAURICE LEVY. Trade-mark for toothbrushes.
- No. 133,068, to UNITED DRUG CO. Trade-mark for certain named dental, medical, and surgical appliances.
- No. 133,072, to UNITED STATES RUBBER CO. Trade-mark for dental dam, surgeon's gloves, light acid-gloves, seamless nipples, and nipples used in nursing sheep.
- No. 133,073, to USONA DENTAL CO., INC. Trade-mark for burs and broaches used with dental handpieces for preparing cavities.

- No. 133,074, to USONA DENTAL CO., INC. Trade-mark for burs and broaches used with dental handpieces for preparing cavities.
- No. 133,075, to UTICA DROP FORGING AND TOOL CO. Trade-mark for dental pliers and dental forceps.
- No. 133,088, to GEORGE L. WERNET. Trade-mark for powder for false teeth.

### *July 13.*

- No. 1,346,125, to ROY HASBROOK. Sanitary teeth cleaner.
- No. 1,346,536, to JOHN J. FITZ-GIBBON. Toothbrush.
- No. 1,346,584, to EDWARD H. ANGLE. Orthodontic implement.
- No. 1,346,719, to IGNACIO NAVARRO M. Dental crown-making machine.
- No. 133,158, to C. DEWEITT LUKENS SURGICAL MFG. CO. Trade-mark for certain named dental, medical, and surgical appliances.

### *July 20.*

- No. 1,346,951, to THOMAS F. GLENN. Mold for forming artificial teeth.
- No. 1,346,998, to THOMAS H. VEALE. Dental appliance.
- No. 1,347,275, to EUGENE W. IDEN. Dental instrument.
- No. 1,347,285, to FREDERIC T. MURLESS, JR. Locking means for orthodontia appliances.

### *July 27.*

- No. 1,347,555, to CHARLES N. REESE. Dental attachment.
- No. 1,348,041, to EDWARD P. OFF. Artificial tooth and method of making the same.







DR. A. H. STEVENSON.

# THE DENTAL COSMOS

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## ORIGINAL COMMUNICATIONS

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### Orthodontia—The Ribbon-Arch Mechanism and Some New Auxiliary Instruments.

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By EDWARD H. ANGLE, D.D.S., M.D., Sc.D., Pasadena, Calif.

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(Read at the annual meeting of the Alumni Society of the Angle School of Orthodontia, Pasadena, Calif., August 7, 1917.)

AT our last meeting one year ago, at New London, Conn., I introduced the new ribbon-arch-bracket mechanism, a description of which was published in the DENTAL COSMOS for September 1916, and which I hope each one of you has read at least once a month ever since, that you may the better understand the principles advocated therein and better comprehend what I shall present today. Naturally I am greatly pleased with the widely favorable reception that has been accorded this mechanism, but especially am I pleased to know of the fine success that many of you, my former students, report in its use in your own practices.

Today I wish to continue our work of last year in further elaborating upon this mechanism in treatment and in indicating how the principle may be advantageously extended to apply in retention. I wish, also, to present other orthodontic

inventions and ideas which are for the most part designed to assist directly or indirectly in the employment of this mechanism, all of which will, I believe, make the work of orthodontists easier and more certain and satisfactory.

But before going on with these subjects there is another matter I wish to discuss which I believe to be of far more importance to you now than any kind of mechanism, new or old. It is the vital matter of *principles*—those principles which not only underlie orthodontia as a whole, but which are behind each step in each orthodontic operation.

Now these principles are not the vague, indefinite and intangible shadows that the work of many orthodontists would indicate they are understood to be, but they are so simple, so plain and so tangible as, when really understood, to become the natural guide and working basis for all orthodontic efforts.

And just in proportion to his grasp of the underlying principles is the work of the orthodontist reduced from chaos to order and system; from mere guesswork as to the outcome of mechanism adjusted and force applied, to the scientific knowledge of what definite results will follow given definite causes, and with corresponding ease and satisfaction in his work. You may be certain that your progress and your success in orthodontia will ever be gaged by your comprehension of its underlying principles and the degree of your conformity to them. And this applies with equal force to all phases of your work, from diagnosis to the adjustment of a ligature, the locking or unlocking of a pin or other attachment, the making and cementing of bands, the adjusting of clamp bands, the tempering and shaping of expansion arches, the controlling, both in degree and direction, of the force from the orthodontic mechanism, etc., and not less to judging of the merits and demerits of orthodontic mechanism, whether new or old. Many permit others to make this decision for them, but this is a sad commentary on their own grasp of principles.

As I pointed out at our last meeting (and as has since been echoed by others), these principles are the simple principles of dynamics, physiology and art as related to orthodontia, in which relationship the laws that govern these subjects are found, when understood, to be not antagonistic but in perfect accord, perfect harmony. For example, when a band is of proper width and thickness and placed in proper location on a tooth, it will be most efficient, most graceful and pleasing in appearance, and in nearest accord with the functions of the tissues directly and indirectly related to the tooth, hence will best conform to the principles above enumerated. Whereas, when it is of improper width or thickness and improperly positioned upon the tooth, with a clumsily brazed seam in evidence, and weakened by the removal of generous portions in festooning it mesially and distally, it cannot properly conform to these principles.

Again, a correctly proportioned expansion arch of proper material, bent to exert the required force in the required directions, with firm, accurate and properly proportioned attachments will not be unpleasing in appearance, will offer but the slightest interference with the functions of the mouth, will operate with the greatest efficiency and in accordance with physiological cell stimulation; therefore it will conform to the orthodontically related laws of art, dynamics and physiology. On the other hand, ill-proportioned, badly-fitting and wrongly placed mechanism not only fails to conform to the requirements of art and dynamics, but, in like proportion, to the laws of physiology, for the reason that it is not only unsightly in appearance and unreliable in the control of force, but must necessarily disturb or even injure the tissues directly and indirectly involved.

Obviously, then, in proportion as orthodontic mechanism as a whole or in any of its parts fails to conform to the principles enumerated, it is defective and unscientific.

My friends, I wish you would think seriously of these things, for, as I have said, the efficiency of the orthodontist and his value as a scientist is in exact proportion to his comprehension of the laws that govern his operations and his technical skill in the use of the best orthodontic mechanism. There are many men practicing orthodontia today who have thus far failed to grasp this fundamental truth. Often I have stood by the chairs of orthodontists and seen their work, and I have seen work from the hands of many others, also I am familiar with the writings of orthodontists and I know whereof I speak. All too often their technique in the assembling and adjusting of the mechanism they employ is most crude, careless and unskilful. The degree of force they exert on the teeth and the directions in which it is exerted are frequently but matters of conjecture with them, determined only by "watchful waiting," and resulting not only in the more or less haphazard movement of teeth, but often—and what



is far more serious—in the positive injury of the alveolar tissues, as attested by a large number of skiagraphs I have collected which verify this statement and which I would ask each of you to study carefully in our clinic.

And this is not all. Instead of keeping the condition of each case well in hand and at every visit of each patient doing then and there all that is indicated to be done at that time (and no more), so that the work may progress to completion with physiological rapidity, patients come week after week and month after month and all too often are dismissed with “a lick and a promise,” until finally the period of treatment, which might easily have been limited to weeks or months, lengthens out into years—two years, three years, five years, seven, even eight years, and still the work is unfinished. No wonder such orthodontists are “busy.” No wonder that patients and parents become discouraged. No wonder that capable dentists, whose opinions we may well consider, criticize orthodontia, nor that our important work so often receives blighting censure from the teachers of our patients and others of the laity. The practice of unnecessarily burdening children with unsightly orthodontic mechanism during the most important formative period of their lives, say from the ages of four to twelve and even fifteen years, as many orthodontists are doing, is little short of criminal.

To my criticisms of the inordinately long time consumed in treatment there always comes the reply, “I don’t believe in too rapid movement of teeth.” Neither do I, but I do believe that nature has established a very reliable rate of speed for tooth movement, namely, the progress of teeth in eruption, and while it may not always be advisable for us to equal this speed, it seems equally inadvisable to diminish it from ten to twenty times, and to do so is to carry this “I do not believe” very far onto indefensible ground.

I have also seen numerous cases of needless interference with nature in her efforts to erupt the teeth and develop

the alveolar process and even some in which the appliances were actually handicapping normal growth and development. I am inclined to think there are many such cases, and they must to a large extent be due to a lack of fundamental knowledge on the part of the orthodontist of the normal forces of growth and development. Also, I have noted numerous other instances where treatment had long been in progress to overcome malocclusion which had clearly been caused by pernicious habits of lip or tongue, and although the habits were still clearly in evidence, both orthodontists and patients were entirely oblivious to their existence.

I think it will yet be found that there is another most unfortunate result of unnecessarily long-continued hampering of the normal freedom of individual teeth, namely, that it is the exciting cause of greater or less absorption of their roots. Further facts to substantiate this belief, however, are necessary.

Now I do not say all these things in a spirit of fault-finding, but I say them in the earnest hope of arousing you to a sense of your responsibilities, and in an effort to stimulate you to develop greater skill in your technique and to gain a clearer comprehension of the principles which underlie your daily and hourly work, without which new appliances, no matter how faultless in principle or in construction, could add little to your efficiency.

The trouble seems largely to be that many orthodontists see only details, *things*, and these vaguely; not the subject in its entirety with the principles that underlie it and that, as I have said, underlie each smallest step in each operation. The “pointer getter” is an example. You know that in his methods of practice he is as changeable as a weathercock and never attains much proficiency. And I believe that the reason so many are misled by the false and often ridiculous teachings that are all too common in orthodontia is because they do not reason from *principles*.

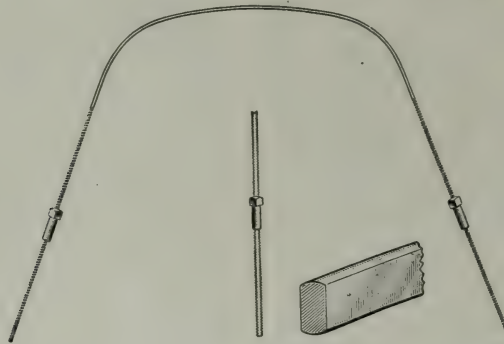
Another thought. Our daily work is largely the repetition of a series of

simple mechanical operations such as making and cementing bands, modifying the forms of expansion arches, locking and unlocking the various forms of attachment, etc. And because there are not many best ways, but *only one best way* to do each of these things, this should become the standard way and its continued repetition should lead to the greatest proficiency on the part of each orthodontist. Also, what is extremely important, the motions necessary to the performance of each step in each operation would thus be reduced to the fewest possible number, with a corresponding conservation of time of both patient and

in continuing the treatment of a number of patients left by one of our own valued members, Dr. Wellslake D. Morse, who died at his home here in Pasadena in February last. In these cases nearly all phases of treatment have been encountered, and I am further confirmed in my belief that with these appliances it is more easily possible to conduct treatment, and that in closer accord with the physiological demands of the tissues, especially of the alveolar structures, than with any we have previously employed.

You will remember that both long and short ribbon arches which I described to you were .022" thick by .036" wide

FIG. 1.



operator. I want you to think of this, for I know it is not impracticable, but on the contrary very practicable and in keeping with the spirit of the great efficiency movement that has come to be recognized as of practical advantage in all phases of human endeavor, even, at last, in specific branches of modern surgery.

#### RIBBON-ARCH MECHANISM.

Let us now hastily review the ribbon-arch mechanism as I gave it last year, and see if, with our combined experience in its use since then, we find any changes to be desirable either in the appliances themselves or in the methods advocated for operating them.

I have had ample opportunity for conducting further practical tests with them

(Fig. 1), and that it seemed to some of you at that time that an arch so delicate might not afford sufficient power to meet all demands, especially for widening and narrowing dental arches. In the severe tests of this kind to which I have subjected it I have found no need for a heavier arch and I have accomplished both operations more easily with it than I ever did with heavier arches. This, I think, is explained in the fact that the ribbon arch acts so evenly and continuously; that the stimulation of the cells, in its use, is so nearly physiological. I am sure if you have not succeeded in widening or narrowing dental arches with it it was for the reason that in finally placing the arch in position upon the teeth you accidentally bent it in such a way as to reduce its power—something that

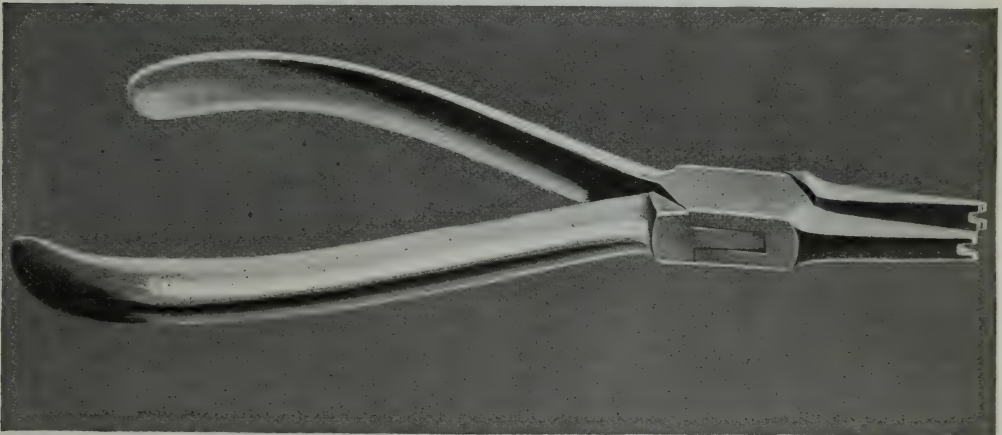


may easily happen unless you are very careful and painstaking in adjusting it—or, that you failed to take advantage of another force which I wish here to emphasize, for I fear it is not clear to some of you, namely, the twist or torque of those portions of the arch that lie within the curvilinear sheaths. I think this latter force is quite as powerful as the usual simple expansive or contractive force of the arch, and if you fail to enlist it by not giving the ends of the arch the proper twists before inserting them in the sheaths, so that they will

the two forces conflicted and to a certain extent neutralized each other. Again, I say, think of these points and weigh all your mechanical problems carefully. Be master of them and leave nothing to chance.

I have also found that for all other movements of teeth, both of roots and crowns—and the experience of most of you coincides with mine in this—the power is abundant and the tooth movements have been prompt and satisfactory. The reason is of course apparent: the great range of elasticity in the arch,

FIG. 2.



bind for a tilting outward or inward movement of the crowns of the anchor teeth when this is needed you are sacrificing much possible efficiency in the use of the ribbon arch. Of course the power to be gained from the torque in the arch applies equally to the relation of the arch with the brackets as to its relation with the sheaths.

You must think and reason carefully on these problems in dynamics, for on them your efficiency and success depend so largely. I have been greatly surprised to find, on examining some of your cases during treatment, that where the arch was properly adjusted to give the desired lateral movement outward, the torque within the sheaths was exerting force for the opposite or lingual movement of the anchor teeth. Thus

coupled with the very ideal attachment of the teeth to the arch, which firmly controls their movement, but which at the same time permits them desirable freedom. Moreover, I believe when all the power in the arch is enlisted it is not so great as to cause the teeth to move more rapidly than with physiological speed, as I have found no instance in which this seems to have occurred as evinced by soreness, pain, etc. My general rule is to enlist the full power of the arch, provided, of course, cell and capillary function is not to be unnecessarily interfered with through the too frequent readjustment of the appliance. Of course this rule might sometimes need to be modified. The trouble, however, will not be that the teeth will move too fast, but that they may, without

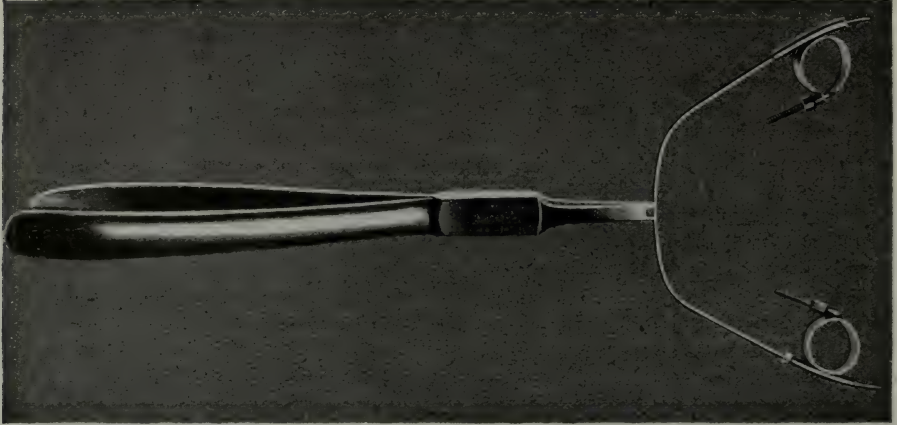


proper supervision, move too far. Instead of a heavier arch being desirable I think one even more delicate may, for reasons which I shall point out later, be more advantageous in certain cases.

Some of you have broken these delicate arches. I, also, have broken two

or forming the decided bend for engaging a bracket on a tooth that is in pronounced lingual occlusion, as in Fig. 10, the special pair of pliers which I have recently devised (shown in Fig. 2), will be found of great assistance, particularly in the first application of the arch.

FIG. 3.



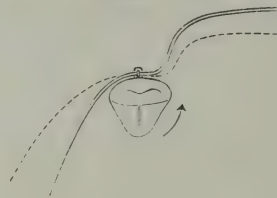
of them, but in my case the fault was clearly my own. It ought not to be necessary to remind men who are working with precious metals, as you are doing, that the metals occasionally require to be *evenly* annealed, especially if they are subjected to considerable molecular disturbance, as in the pronounced bending and subsequent straightening often required in the ribbon arch. Also it is well to remember that we are undergoing a radical change from heavy to delicate mechanism and that it is imperative for us to develop delicacy of touch and manipulation. A blacksmith would have to re-educate his fingers if he were to become a successful watch repairer.

#### RIBBON-ARCH SEATING PLIERS.

Although I still believe the safest way to seat the arch is, in most instances, by means of skilful fingers, occasionally assisted by a piece of orangewood or bone, yet for gaining the necessary lateral twist in the arch to effect rotation,

It will be noted that the beaks of these pliers are bifurcated, thus forming a pair of minute jaws on each beak. All four of the jaws are of the same dimensions. The bifurcating slots are slightly larger than the width and depth of the bracket and permit the two pairs of jaws

FIG. 4.



to operate one on each side of the bracket. A delicate groove traverses the inner surface of each of the four jaws close to the end of each. When the jaws are closed on the two sides of a ribbon arch the arch is evenly and firmly held in these grooves, as shown in Fig. 3. Now by firmly grasping the handles of the pliers the arch may be twisted and

seated in the bracket, as in Fig. 4, or sprung and bent as it is carried lingually and seated in the bracket, as in Fig. 10, without any undue strain on the bracket. In seating the arch as in Fig. 10 its two ends are first engaged in the curvilinear sheaths, the nuts having been turned well forward so that they will in no way interfere with the bending of the arch as it is brought into bracket relations by means of the pliers. Not until the arch has been seated in the brackets should the nuts be moved to their proper tension relations with the anchor sheaths. I am sure you will derive much satisfaction from the use of these pliers.

#### LOCK PINS.

The original dimensions of the main shaft of the lock pins were .010" by .010". In experience pins of these dimensions proved too small, in some cases, to afford the necessary locking strength. As now made they are .010" by .010" near their points, gradually increasing in diameter antero-posteriorly to .014" at the beginning of their heads, this additional width making them amply strong.

Now let me here interpolate a word with regard to measurements. Those of you who still persist in employing the much out of date "gage" should change your system of measurement and learn to think in thousandths of an inch through owning and employing a small micrometer which is far more accurate, definite, scientific and up to date.

The pins are made of a fine quality of brass. Some of you have requested that they also be made of pure gold or of some alloy of precious metals. I have no doubt the manufacturers will be glad to supply them to you in precious metal. For my own needs, however, I much prefer them of brass, as I have been unable to find any precious metal alloy that equals brass in toughness and strength, though I early experimented quite extensively with alloys. Although in their immediate region brass pins may cause slight discoloration of the ribbon arch, if the patient does not give regular and

proper attention to oral cleanliness, yet the proper cleansing of the teeth by the patient being easily possible when this mechanism is used, there should be no real objection to the use of brass pins.

And here let me interpolate another word. All agree that the teeth should be kept properly cleansed during orthodontic treatment and much has been said and written on the subject. Many orthodontists devote much time at each appointment of their patients to the spraying and cleansing of the patient's teeth, and strongly advocate this procedure. Now I radically disapprove of it, or the transference to the orthodontist of the work which rightfully belongs to the patient. It is the orthodontist's duty to place only such mechanism upon the teeth as will not interfere with their regular, systematic brushing and cleansing by the patient at least twice a day, and then he should insist on the patient's doing it, for the time and effort of the orthodontist should be more advantageously employed. If a patient does not keep his teeth clean and the orthodontic mechanism bright, it is clear that he is lax in his duties and should be disciplined.

At our last meeting I recommended that in order to clinch the pins in the brackets they should be bent forward and upward. Experience has proved, however, that they are more in the way of the lips of the patient and that it is more difficult to straighten them for their removal when so bent than when they are bent to one side. The point of the pin is grasped with a pair of close-fitting pliers (the flat beaks of the arch-bending pliers serve admirably for this purpose) and drawn through the bracket until its head rests firmly against the ribbon arch which has already been fully seated within the bracket. With full tension still maintained the pin is now drawn sharply at right angles to the bracket (as in A, Fig. 30), thus giving it a sharp bend and firm clinch. Now, without in the least disturbing the bend, the pin should be clipped off *close* to the side of the bracket (as in B, Fig. 30), leaving no projection and requiring no

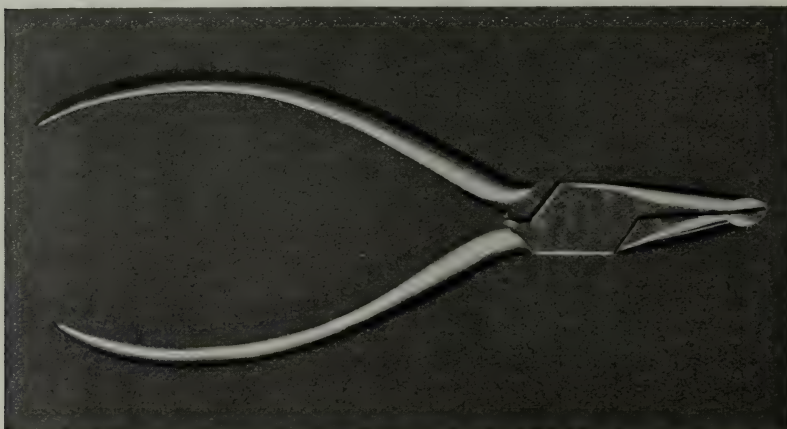
burnishing which would only endanger the bend. In order to save time in locating the bend for the removal of the pin we, here in the West, have agreed to always make it toward the left of the bracket.

#### PINCUTTERS.

I have found it impossible to cut the pin close to the side of the bracket with

case, in addition to the distal movement of the upper molars and bicuspid to make room for the unerupted cuspid, the labial movement of the roots of all the incisors and the bodily movement of one of the laterals in a mesial direction was necessary, the latter having been accomplished, as shown in Fig. 8, through the influence of the cleats attached to the arch.

FIG. 5.



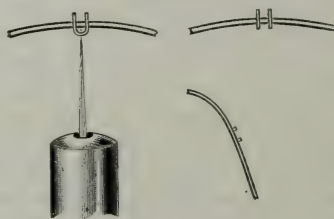
scissors without disturbing the bend, so for this purpose I have devised the minute pincutters shown in Fig. 5, which "do the trick" perfectly. They will also be found much better than scissors for clipping off the superfluous portions of wire ligatures.

#### CLEATS.

The little cleats, shown in Fig. 6, have been improved by stamping them from much thicker material than that of which they were at first made, in order to give them greater strength. I am disappointed that many of you are not making as much use of the cleats as you should, for their occasional, if not frequent, use is absolutely necessary to successful practice with this mechanism in such cases (quite numerous) as those I pointed out last year, one of which is illustrated in Figs. 7 and 8. In this

I cannot too strongly recommend you to master the very simple operation of properly locating and soldering these cleats, so that when their use is indicated you will not procrastinate, but

FIG. 6.



promptly employ them, and in the right way, so that they will be efficient. And here is a little improvement in the technique of the operation of soldering the cleats over that which I gave you last year. A very minute piece of solder, not



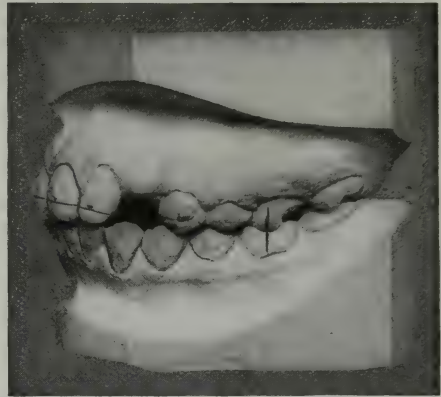
more than .004" in any dimension, is placed on each arm of a cleat and the cleat supported on a straight piece of thin platinum plate in the flame until the solder is fused. The solder-side of the cleat is now placed in contact with the arch at the previously indicated de-

mesially, say ten or fifteen thousandths of an inch, and again springing the arch into the brackets, the desired movements of the teeth will be effectually accomplished. The spurs should be very small. I think they may best be made in the form of delicate cubes of platinum

FIG. 7.



FIG. 8.



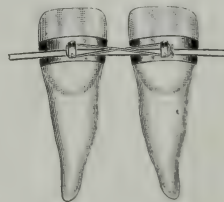
sired point, and the solder again fused, uniting the cleat to the arch. For this the flame of a small spirit lamp is used in preference to the more concentrated and intense flame of the blowpipe, the heat being thus more slowly and evenly raised to the fusing point of the solder, with consequent less danger of overheating the arch. No additional borax is required for the second fusing, provided the arch is clean.

It is well to flow the solder on the cleats during some leisure hour, thus having a supply of them in readiness for use when needed.

A method of closing space between central incisors which I gave you last year is to use a wire ligature as illustrated in Fig. 9. One of our number, Dr. W. C. Smith, has suggested another way to accomplish this which I think in the hands of many would be better. The ligature is dispensed with and two delicate spurs are soldered to the outer surface of the ribbon arch close to the distal surfaces of the brackets on the bands on the centrals. Now by occasionally moving one of these spurs slightly

not more than .015" in any dimension. They are most easily and safely moved by teasing them forward with the point of a needle while the solder is in the molten state, the arch being held in the flame of an alcohol lamp.

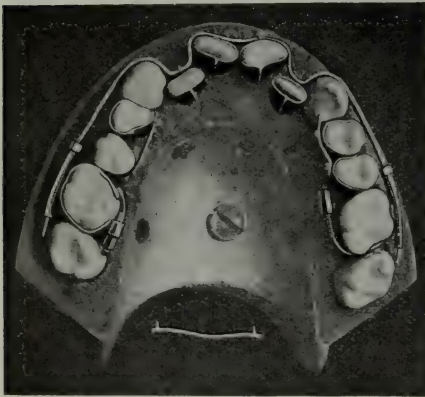
FIG. 9.



Of course the teeth may be moved in the opposite directions by reversing the relations of the spurs with the brackets. By the same means the position of the crown of any individual tooth may be changed. And here is an idea which may be made useful for the double rotation of teeth, independent of the ribbon arch. The mechanism is shown in position on the bicusps on both right and

left sides of the dental arch in Fig. 10. Sections of the ribbon arch are sprung into brackets on the lingual surfaces of the teeth, the force so exerted acting reciprocally between the teeth for their rotation. Of course these segments would need to be removed occasionally, and unbent or otherwise re-formed to properly exert force, and re-seated in the brackets. The bend in the wire on the left should be made at a point midway between the two bracket attachments, as shown in the illustration just

FIG. 10.



beneath the larger engraving, Fig. 10. To give additional force in the direction required for the rotation of these teeth, delicate spurs should be soldered to the arch at points just mesially to the anterior bracket and just distally to the posterior bracket, so that when the wire is sprung into the brackets, after it is bent, an auxiliary pulling force will be exerted to bring the lingual angles of the teeth into closer relations.

The spurs shown in the illustration are much longer than should be employed. They were intentionally so made in order that they might be better shown by the camera.

#### CURVILINEAR SHEATHS.

Now a few words in regard to the mechanical principle involved in the use of

the arch within the delicate new curvilinear sheaths of the anchor bands (Fig. 11). Much to my disappointment some of you, I find, do not seem to fully comprehend the principle or realize all of its advantages. All of you know how prone any arch is to work forward in straight sheaths, this being in accordance with the law that motion follows the line of least resistance, as in the displacement of the handle of a hammer, or the loosening of the ferrule of a cane or umbrella, etc. Of course the forward displacement of the arch and the friction sleeves of the nuts, caused by jarring incident to occlusion, mastication, etc., is only another illustration.

FIG. 11.



Now a great advantage in the use of the curvilinear sheath which seems not to be clear to many of you is that with it it is not only easily possible to wholly prevent the working forward of the arch and to keep the friction nuts firmly seated within their attachments, but also that the arch, without auxiliary attachments, may be caused to work distally within such sheaths when this is desired, even to exerting considerable force for the retraction of prominent incisors. (Of course in such cases the nuts are turned well forward, as on the lower model (a study model) in Fig. 12.) This crawling movement in a distal direction is brought about by very evenly bending those portions of the arch that are to lie within the sheaths to arcs of smaller circles than those to which the sheaths are bent. Now, when the ends of the arch are placed in the sheaths they are on tension through the conforming of the smaller curves of the ends of the arch to the larger curves of the sheaths,



and the tension so exerted tends to work the arch distally or along the line of least resistance. In other words, the ends of the arch so bent act as spring hooks within the sheaths to pull the arch distally. But if you will persist in forcing the straight arch within curved sheaths and not first amply curve its ends, the result will be the same as when a straight arch and straight sheaths are employed, namely, the arch will tend to work forward, only in the former case

FIG. 12.



this tendency will be more pronounced than in the latter, due to the effort of the metal within the sheaths (which is on tension opposite to that secured when the ends of the arch are properly curved) to gain equilibrium along the line of least resistance.

This ought to be clear to you and it ought also to make clear why there was distal displacement of the anchor teeth in one of the cases we saw in the clinic today. The reason was obvious. Force had been wrongly directed. The straight ends of the arch had been sprung within

the curved sheaths, and the anterior part of the arch being firmly held in the brackets on several anterior teeth, the arch was prevented from working forward, so the anchor teeth were of necessity gradually pushed distally, simply as a result of the effort of the straight arch, sprung within the curved sheaths, to gain equilibrium along the line of least resistance. Had the ends of the arch, before they were seated, been bent to the arc of a smaller circle than that to which the sheaths were bent, the direction of force, as I have said, would have been reversed and there would have been no displacement of the anchor teeth. On the contrary they would have been held in their proper relations. Also the friction nuts would have been kept firmly seated within the sheaths and their accidental turning would have been impossible. It is well to remember, however, that we may on occasion take advantage of this possibility of moving anchor teeth distally, though it is better as a rule to depend for such movement on tightening the nuts in conjunction with intermaxillary ligatures, etc., as in this way the power may be more perfectly controlled.

There is also a further advantage to be had in the use of the curved sheath that some of you are not availing yourselves of, namely, to allow the ends of the arch to project well through the distal ends of the sheaths, at least in the beginning, instead of cutting them off close, thus not only giving a longer arch which may be useful later on as the dental arch is enlarged, but offering longer continued resistance to the natural tendency of the arch to forward displacement as its ends gradually travel forward in the sheaths through tightening the nuts than would be the case with a shorter arch.\*

A still further advantage of the curved sheath which you all must appreciate is that it interferes far less than

\* That the ends of the arch may be more easily slipped into the sheaths they should always be beveled and slightly coated with vaselin.



the straight sheath with the functions of the cheeks.

At our last meeting I carefully described the use of the ribbon arch in the treatment of a typical case belonging to Division 1, Class II, and told you how the retracting force within the curvilinear sheaths had been taken advantage of for the lingual movement of protruding upper incisors preliminary to the employment of intermaxillary force. As the illustrations were not ready for that meeting I could not show them, but I do so here that you may observe the possibilities of this source of power, new in orthodontia. It was tested in this case for the first time and in this instance attempted only as a test.

By comparing the positions of the teeth as shown by the two models in Fig. 12 you will see that considerable lingual movement of the crowns of the central incisors has taken place. This was accomplished wholly by the power from the spring of the ends of the arch within the curvilinear sheaths and within ten days of the application of the force, after which time hooks were attached to the upper ribbon arch opposite the cuspids and intermaxillary ligatures employed in the usual way.

The models at the beginning of treatment and at its completion are shown in Fig. 13.

#### DEPRESSING THE INCISORS AND ELEVATING THE MOLARS SIMULTANEOUSLY.

You will remember I stated that the active treatment of this case was embraced in a period of two months and that there were no unfavorable symptoms in the tissues. You will also remember that I described the manner in which the incisors were depressed simultaneously with the elevating of the molars, in this case, during the establishment of the normal mesio-distal relations of the teeth. This was done by aligning the sheaths on the anchor bands of both upper and lower first molars so that the ribbon arches, engaged passively therein, aligned at points on the gums about one-sixteenth of an inch

apically from the gingiva. Now when the ribbon arches were carried occlusally and seated within the brackets there was, in consequence, force exerted for the distal tipping of the molars by the arch within the sheaths prying apically on the distal ends of the sheaths and occlusally on their mesial ends. Also, the force so exerted of course reacted in an apical direction on the incisors so that they were depressed to their proper height in

FIG. 13.



the line of occlusion, and the molars were elevated and tipped distally to their proper height and position in the line of occlusion, as shown in the lower model in Fig. 13.

I would ask you to study the pictures (Fig. 13) carefully, and you will see that these movements, always so desirable and heretofore so difficult, have been accomplished. I could easily have carried these movements still farther, even to the extent of causing "open bite." As I have since treated a number of

similar cases with like satisfactory results, I repeat here that I feel sure there is no longer any occasion for prolonging the period of treatment in requiring our patients to wear "bite plates" or "cribs" in order to gain the proper heights of the planes of their teeth. While "bite plates" may doubtless often be employed to advantage in retention in order to relieve the force of mastication on molars that have been elevated, and to accentuate pressure on incisors that have been depressed in their sockets until the alveolar process and periodental membrane have attained their physiological structural reorganization, yet I am convinced that they are now much out of date for active treatment for the purpose of gaining the proper heights of teeth in the line of occlusion.

There is another point in connection with the treatment of this case, as well as of all similar cases, of much importance, and though I clearly called attention to it in the last edition of my book, yet it seems to have been entirely overlooked by all of you who have written or talked on the subject, namely, that the abnormal closure of the bite anteriorly is largely the result of the tipping of the molars, due to the axial stress being wrongly placed. Instead of the great weight of occlusion of the upper molars being received largely on the posterior half of the lower molars and the anterior half of the uppers, as it would be normally, it is in these cases transposed to the anterior half of the lower molars and the posterior half of the uppers, thus causing the lower molars to tip forward and downward, and allowing a closer closure of the jaws than normal. Treatment has reversed the axial stress so that there is now perfect equilibrium between teeth and alveolar process.

Perverted stress upon the molars resulting in the same condition of shortened bite is also shown in Fig. 7, a case belonging to Class I, where the jaws are in normal mesio-distal relation, but where the upper molars and premolars on the left side have moved forward fol-

lowing the premature loss of the temporary cuspids, assisted by improper functioning of the nose. Establishment of the normal axial stress relations of molars and premolars has here, also, resulted in lengthening the bite.

I wish here to again call your attention to another thought I made clear in the seventh edition of my book, but which I am sure has been wholly overlooked by many of you in the treatment of typical cases belonging to this division of Class II, namely, that logical treatment demands that force first be chiefly directed to the correction of the positions and relations of the first molars, closely followed by the movement, first, of the bicuspid and, finally, of the incisors and cuspids, for the reason that this was the order in which the malocclusion was established. It is therefore the logical and the easiest way to unravel the difficulties. I have seen many such cases in which the treatment was supposed to be completed, but in which this order of treatment had been reversed, or begun by reducing the prominence of the upper incisors—the mere symptoms of the real difficulty. Upon examining the relations of the upper with the lower molars in these supposedly finished cases I have often found them little better than in end-to-end bite. Failure is certain to follow if the molars are left in these relations. Therefore I would emphasize that *both upper and lower molars always be first tipped to their full upright positions*, and that their full normal mesio-distal relations also be gained through intermaxillary force, thus establishing the normal axial stress upon their crowns and roots and upon the associate tissues. This is absolutely essential to success in every case.

If you will carefully examine the relations of the molars in the case here shown you will see that this has been accomplished. You will note in the upper model in Fig. 13 that through the malocclusion of the first molars their axial stress has been perverted so that the crowns of both upper and lower are tipped forward and this tipping must continue and accentuate the mal-rela-



tions of all of the anterior teeth, as well as to continue the distal sliding movement of the mandible and still further shorten the bite.

By examining the lower model you will see how the axial stress on the crowns and roots of both upper and lower molars has been restored to normal, simply as a result of tipping them upward and backward into their physiological axial stress and cusp relations, followed closely by the correct placing of the bicuspid, cuspids and incisors in their logical order, at the same time assisting the forward movement of the mandible through intermaxillary ligatures. You will also note that both upper and lower incisors have been depressed in their sockets until they are of proper height, and that the molars have been elevated.

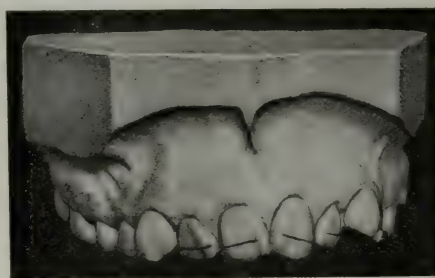
I wish you would compare the models of the case shown in Figs. 12 and 13 with those of another case which Dr. Smith will show you, the original condition of the two cases having been almost identical. The latter case has been under treatment by a well-known orthodontist for more than three years, and nothing has yet been accomplished except that one of the upper first molars has been forced into most pronounced buccal occlusion. The reason for such a lamentable result is only partially explained by the appliances that were employed. These Dr. Smith has removed from the teeth of the patient and will show them in connection with the models of the case.

Several other models of cases from other orthodontists, which have recently come under my observation, the results of treatment of which are scarcely less deplorable, will also be shown, and these not only emphasize the necessity for a closer study of principles, but—and I think all thoughtful orthodontists and dentists will agree with me—for more just protection of the public through better legal regulations of the teaching and of the practice of orthodontia than now obtain.

I wish also to speak of another case, reported to me today by one of your

number—a story that should be of much interest to you all. This gentleman referred a patient of his who was wearing the ribbon-arch mechanism to another well-known orthodontist in a distant city. The case belonged to Class I, an average case of a type commonly met with. After two months the patient returned home. Some changes for the better were noted and some for the worse. Upon removal of the ribbon-arches my informant said, "They curled up like watch springs," which occasioned him much surprise until the patient, upon being questioned, explained that where the bends in the arches had on several occasions been slightly straightened, this had been done without once removing the arches from their anchor connections. They had simply been lifted from the brackets, the bends pinched between flat-beaked pliers, and the arches again seated and locked within the brackets! It certainly is not new appliances that this man needs.

FIG. 14.



PLAIN BANDS.

Last year I described the positions that plain bands should occupy on anterior teeth in order that they might be most efficient and most artistic in appearance, and here is an idea that will assist you in more accurately positioning your bands. First, indicate by a lead pencil mark on the moist surface of the enamel of all the teeth to be banded the position that the incisal margin of each band should occupy, as shown in Fig. 14. Then it is easy to pinch and form the



bands to conform to these lines, so that after the teeth have been gradually moved into conformity with the line of occlusion the bands, as well as the teeth, will assume harmony and balance of relation.

I showed you last year a new instrument, Fig. 15A, for holding the ends of

practicable the plan would be valuable, for it would greatly simplify this oft-required operation. I regret that I have not now time to show all of you (some of you have seen them) all the various models which marked the progressive steps in the development of this idea. It surely would interest you and it

FIG. 15 A.

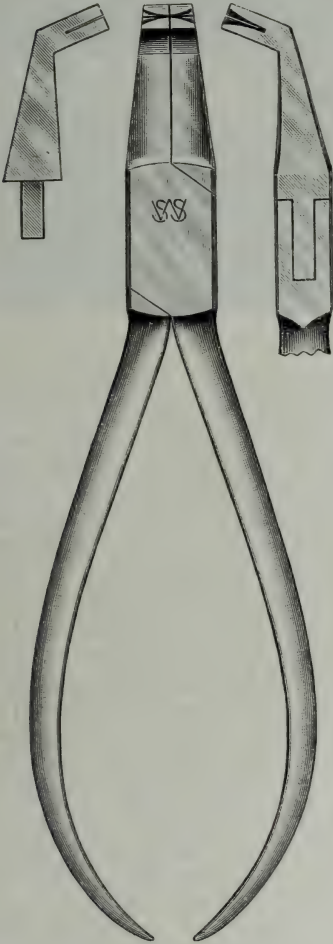
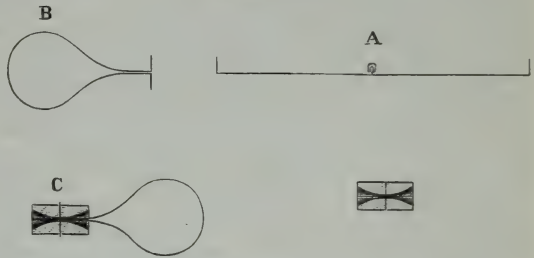


FIG. 15 B.



might also surprise some of you to learn what difficulties have to be overcome and what time and energy expended to bring to fruition any idea of this nature. And it would surely cause many to hesitate and to weigh their suggestions before offering them so promptly and so fatuously as "improvements" or "modifications," as they are so prone to do.

As usual the first models were very complicated, but after eight successive forms had been thoroughly considered, modified, simplified and discarded, the ninth developed into what I think you will find to be a very perfect and efficient instrument. It is shown in Fig. 16.

The beaks of these new band-forming pliers open by pressure on their handles. Near their ends the beaks are bent sharply at an angle of sixty-seven and a half degrees. A groove or slot passes transversely through both beaks, which in depth is a little greater than the width of the standard band material, and in width slightly greater than two thicknesses of standard band material. Passing obliquely through both jaws of one of the beaks is a clamp screw with a square head, which forms a miniature vise. The outer edge of the other beak is convex to conform to the lingual or concave surface of the incisors.

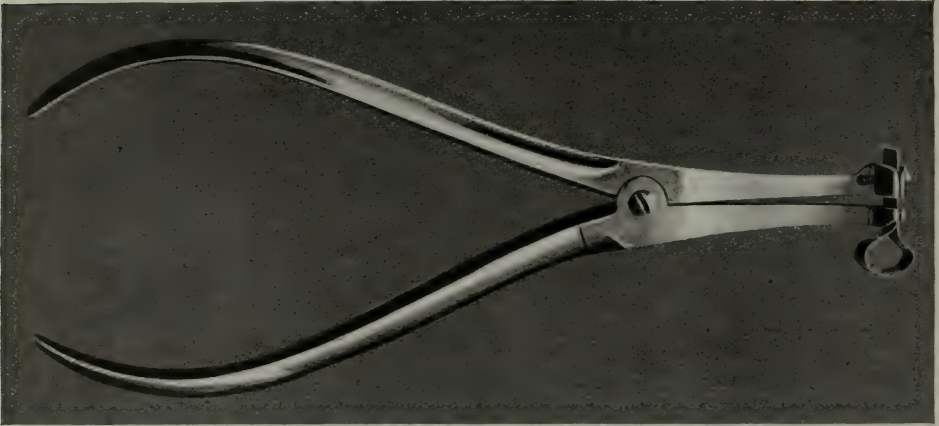
In use a piece of bracketed band ma-

short lengths of band material about a tooth while the band was being formed with the band-forming pliers. It is a very efficient instrument, but after perfecting it it occurred to me that it might be possible to do the entire operation, or both the holding and pinching, with one instrument, and if it could be made

terial is bent in the form of a loop, its two ends seated in the transverse groove of the beaks, as shown in Fig. 16, and

the band material thus tightly drawn about the tooth. In addition to gentle force for closing the handles, pressure

FIG. 16.



the screw firmly tightened by means of a key. The loop is then worked over the crown of the tooth to be banded,

FIG. 17.

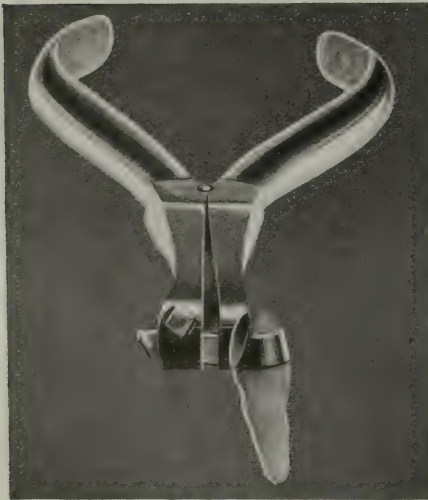


Fig. 17, to the position previously indicated by a pencil mark on the enamel. The handles are now pressed upon and

should also be exerted simultaneously by the beaks of the pliers on the band material in an apical direction. This assists in taking up the slack in the band material at its incisal margin, thus gaining closer adaptation of the band at this point and avoiding the unpleasing crimps in the incisal margin so often in evidence in badly fitting bands.

To assist in the flow of the metal the burnisher should be used on the *labial margins* of the band *only* while pressure is exerted on the handles of the pliers.

The band material is now cut between the beaks of the pliers and the pliers removed. The band is now gently removed from the tooth and soldered in the usual way, and there is one point in connection with the latter operation which must be borne in mind. A band made in this manner is such a perfect fit that it must be soldered without in the least changing its form or size. For this reason it must be very lightly held by the band-soldering pliers while it is being soldered so that the two jaws of the unsoldered band will not be unduly pressed together, as this would diminish the size of the finished band and it would not go to place on the tooth.



After the band is fitted and soldered it is re-seated upon the tooth and burnished to close adaptation to the *lingual* curvature of the crown. It is then removed and further strengthened by flowing solder over its concave lingual surface, the soldered ends trimmed and smoothed, and the band polished and set in position on the tooth in cement. The result is a most beautiful and accurately fitting band.

If you will take time to master this method of band making you will find that your bands require very little cement and that they may be worked into their correct positions on the teeth more easily and satisfactorily than the bands you have heretofore made. They will also have greater efficiency and be more artistic in appearance. And the force exerted in forming the band is distributed so evenly that it occasions practically no shock to the sensitive periodontal membrane.

In learning to use this instrument of course you will break some bands, force being exerted so easily with it. But when you have mastered the proper "feel" in force control, plus the proper use of the burnisher, as you should do easily, you will be as greatly pleased with this new method of band forming as I am. I believe it marks a very important step forward in band-making.

I must not fail to mention that the margins of the jaws of the pliers next to the tooth should always be slightly lubricated with vaselin, as this lessens the friction with the band material and insures better adaptation.

Obviously "rights" and "lefts" of these pliers are necessary to meet the requirements of both sides of the mouth. In our clinic this afternoon I hope you will make free use of a pair of models of these pliers which I have made.

#### ANCHOR BANDS.

Let us now consider another important phase of orthodontic technique, namely, that of fitting bands to molars, and I wish to prelude my remarks relative to this subject with a quotation which seems to me so apt that it might almost

have been written for this occasion: "That is the best mechanical device which does the work at the lowest cost. Yes, but in order to attain the lowest cost it must be able to stand up under all the stress and strain to which it is ever likely to be subject; which is to say that the engineer who designs a mechanical device, whether it be a bridge or the locomotive that passes over the bridge, must aim at *permanent* and *enduring* results. How are such results obtained? There is only one way: the engineer cannot design wilfully, capriciously, or idiosyncratically. He cannot use this material simply because it may be cheaper or look prettier than some other material. He cannot say to heat, 'I wish you would act this way,' and he cannot say to gravity, 'I wish you would act that way.' No, he must humbly submit himself to *law*. He must observe the natural order of things, and design in harmony with this order. He must select in accordance with right relations. As we say, he must plan justly and build honestly. All this he must do if he would do his duty as an economist."

As you know, two distinct types of bands are employed on molar teeth, *i.e.*, the plain brazed band and the clamp band, both having their advocates. In use each has certain advantages and certain disadvantages, but the true orthodontist will be content only with what is best for his patients—best mechanically and best physiologically. Therefore I believe both should be very thoughtfully considered in order that it may be intelligently determined which is best. Here, again, consideration of the related principles of dynamics and physiology will help in reaching a decision.

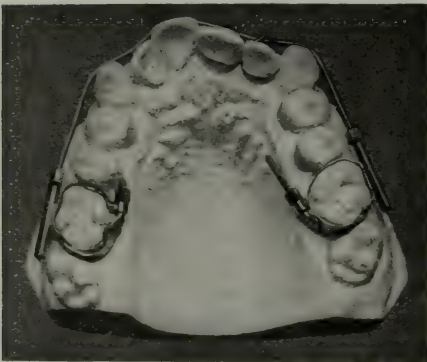
Doubtless plain bands may in skilful hands afford reasonably firm media of attachment between the teeth and the power part of the mechanism, but that they frequently give trouble by loosening under the constant jarring incident to occlusion and by reason of the strain of the appliances is undeniable, while the clamp band, even in the hands of the amateur, may be so firmly clamped



as to make its accidental displacement almost impossible. Also the plain band requires to be made at the chair for each tooth on which it is to be adjusted, thus causing considerable inconvenience to the patient besides consuming much of his time, as well as that of the orthodontist, while the clamp band is ready at hand and may be quickly and easily adjusted, probably in less time than is required for the setting of the plain band in the necessary cement.

The plain band, however, has two advantages over the clamp band. First, it is less expensive, a factor which seems

FIG. 18.



to weigh mightily in its favor with many. Second, and the one which is most often exploited, is the elimination of the screw, nut and ferrule of the clamp band which necessarily interfere more or less with the functions of the tongue.\* And this undoubtedly is an advantage, for every bit of material that can safely be eliminated from orthodontic mechanism is certainly advantageous, and I must admit that it is a factor of much consideration when the screw is wrongly placed in the adjustment of the clamp band, which, unfortunately, is all too

\* The Oettinger band, wrongly called the "Lukens" band, is so bulky and clumsy in its clamping mechanism, with such lack of firmness and stability in the attachment of the anchor sheath to the band, that it must here be left out of consideration.

often. A familiar example is shown on the right in Fig. 18. However, we must remember that a band with its clamping screw so adjusted reflects only the incompetence of the one who so places it, and not on the principle of the band, for I insist that the clamp band may easily be so placed that neither its screw nor its nut need in any way injure the tissues of the gum, and that they will be of little more inconvenience to the tongue than a plain band, especially if the brazed seam of the latter be formed on the lingual surface of the tooth.

But there is another factor to be weighed in deciding between the two types of bands which is of immeasurably greater importance than any we have so far considered, namely, the physiological demands of the gingivæ, peridental membrane and alveolar process. Which of the two types of bands is less disturbing to these tissues? And this is a question that should have the most careful thought, for if the bands that we employ for anchorage produce serious injury to the gingivæ and alveolar process, as a very considerable number are doing, it is questionable whether the improvement in occlusion that may be gained will not in the long run be offset by such injury, at least in many cases.

For a long time I have been collecting radiographs of molar teeth on which anchor bands have been worn, and the conditions often revealed have amazed me. Therefore I think it high time that this question be given the serious attention it deserves.

The story these radiographs tell is of an enormous percentage of badly fitting bands, with destruction of gingival, peridental and alveolar tissues in exact proportion to the lack of close adaptation of the band to the neck of the tooth, and this condition is often augmented by superfluous cement. It is by no means limited to cases in which plain bands have been employed, but it is more nearly universal in those cases due to the physical impossibility of gaining perfect adaptation of the margins of plain bands to the necks of molar teeth. Most orthodontists do not realize the

degree of lack of conformity of their anchor bands or the injury they cause, and many of them seem not to care. But the extent of the waste of tissue and the raw and inflamed condition of that that remains, which he must see when he removes his bands, should profoundly impress every thoughtful orthodontist. Dr. Noyes has again and again told this part of the story in eloquent words, embellished with vivid pictures one cannot forget.

If you, also, would radiograph such tissues as they come under your observation, I am sure you would all agree that I have not exaggerated the conditions.

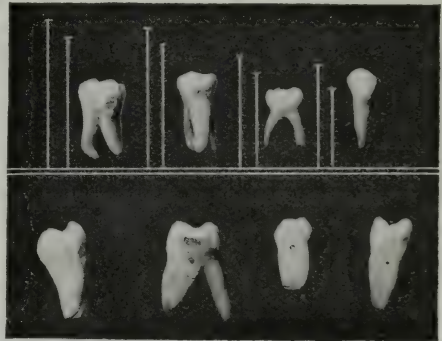
Do these tissues ever wholly recover from such abuse? I am afraid not.

Here is a recently made model, which I will pass among you, of a case from the first molars of which I removed two plain bands that had been worn for three years, and although three months have since elapsed you can easily see from the plaster model alone that there is still a pronounced pathological condition of the tissues about these teeth. You will also note that the radiograph reveals much destruction of the alveolar process. If you have been at all observing you have all seen many such cases.

Now I believe it is not possible to gain the proper adaptation—the necessary physiological adaptation, plus the requisite efficiency—of a plain band to a normal molar tooth. I believe this is only possible with a clamp band, and then only when the band is most *carefully* and *skilfully* fitted. This seems apparent when we consider how greatly the gingival margin of a molar band must be contracted in order that close adaptation may be gained. In Fig. 19 the perpendicular lines at the left of each of the teeth indicate the length of circumference of the several teeth at their necks and at the swells of their crowns, the difference in length of each pair of lines indicating the extent to which the gingival margin of a band would need to be contracted in order that there might be perfect adaptation of band to enamel and the least possible

interference with gum tissue, a degree of contraction which in the case of plain bands it is a physical impossibility to gain in the mouth. Indeed it is not easy to so reduce metal within accurately made dies, as at least some of you know from your former experience in swaging tooth crowns. While in the mouth, if the margin of the band is pressed in at one point it is forced out to almost a corresponding degree at some other point. If trimmed away antero-posteriorly, as many who favor plain molar bands advocate, the band is weakened and its efficiency lessened just in proportion as it is cut away, for its strength can only be as great as that of its weakest

FIG. 19.



point. Besides, the portion of the band that lies gingivally to the swell of the crown in this region should be the chief dependence for preventing the loosening of the band. Certainly the effort to contract this portion of the band by means of a roughened foot-shaped plugger instead of a burnisher, as advocated by some, is not conducive to leaving a smooth surface in contact with the gum, as should by all means be done.

The difficulties encountered in making and fitting plain molar bands are reflected in the writings and discussions of those who employ them, no two, apparently, agreeing as to methods or technique, and remarkably careless statements are often noted, as for example, "It is perfectly safe to say it (the plain band) could be fitted in one-tenth the



time in which the clamp band can be fitted," etc. (See *Dental Items of Interest*, February 1917, page 102.)

Now if it is difficult or impossible for an expert in band-making to properly fit a plain band made for the tooth in

hand, you need not draw greatly on your imaginations to picture what must be the fit of stock plain bands already soldered, the illustrations of which adorn the advertising pages of our magazines.

(To be continued.)

## Follicular or Dentigerous Cyst.

### An Interesting Case.

By R. L. CHASE, D.D.S., St. Louis, Mo.

**HISTORY.** A young lady of about twenty-five years presented with the following history: Slight pain which had persisted for several months in the right superior incisor region. The patient described, though rather vaguely, a tired, listless feeling, which had bothered her intermittently for some time.

FIG. 1.



**Examination.** The examination revealed that the lateral incisor was missing, though there was no space in the arch. The cuspid was slightly rotated and tipped to lingual occlusion. An inconsiderable swelling of the soft tissues proved to be very tense and would not fluctuate. About opposite this area palatally, there was a slight distention of soft tissues.

**Radiographs.** Radiographs showed the missing tooth to be impacted, seemingly within a cyst, and lying in lingual re-

FIG. 2.

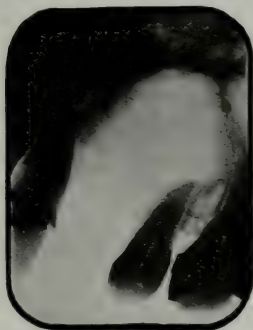


lation to the other teeth. The cyst extended from the median line to the bicuspid region, and seemed to envelop



the apex of the first bicuspid. An absorption of the apical portion of the cuspid was apparent, due in all probability to pressure. The apex of the lateral had perforated the palate and was pressing

FIG. 3.



Taken two months after operation.

the soft tissues downward. (Figs. 1 and 2.)

The crown was removed from the first bicuspid and the vitality test given, the tooth responding. It was therefore de-

The parts were thoroughly bathed with an antiseptic solution and dried, after which iodine was applied, the lips being held away with retractors.

*Operation.* The mouth prop was placed and the anesthetic administered. The cuspid was first removed. This opened the cyst, as the fluid came at once through the alveolus. A slight pressure was then maintained above the cyst until the fluid drained and was caught on gauze, none being allowed to drop into the mouth. The impacted tooth was now located and, with the aid of the Derenberg tweezers, removed. The cystic wall was caught with the tissue forceps and carefully peeled and dissected out in its entirety.

*Post-operative procedure.* The cavity was then syringed with an antiseptic wash, followed with normal saline, swabbed with iodine, and packed with sterile gauze. Four hours later this gauze was removed and a sterile dressing of antiseptic dressing powder was introduced. This dressing was changed and the cavity irrigated daily for four days. On the fifth day and at regular intervals

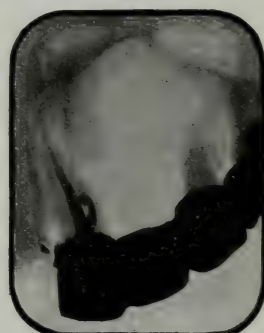
FIG. 4.



FIG. 5.



FIG. 6.



Taken four months after operation.

cided to leave this tooth undisturbed, even though its prognosis might be doubtful.

*Pre-operative procedure.* Preparations were made for general anesthesia, nitrous oxid and oxygen being preferable. Cotton packs were placed in such position as to protect the field of operation.

thereafter, sterile dressings of gauze and balsam of Peru were used. This acted as a stimulant to bone granulation, having as well antiseptic properties. (Fig. 3.)

*Results.* The wound healed without further complications. The first bicuspid gave no trouble and in two months

had tightened considerably. A vitality test made at this time showed the tooth to be vital. The patient's general condition had improved and she thought that her listless feeling had entirely disappeared. Six months after the operation the patient had gained ten pounds in weight. (Figs. 4, 5, and 6.)

When the statement is made that a certain cyst is of some definite form, that statement is open to question. Therefore a word regarding the cyst referred to

here. Whereas it seems most likely that the cystic wall is the original tooth follicle, thickened because of irritation and possibly infection, it is also probable that we have merely a so-called "dental cyst." However, since pressure has in all probability been the dominating factor, since the cuspid tooth was vital, and since the impacted tooth lay within the cyst, it would tend to distinguish this as a dentigerous cyst.

METROPOLITAN BLDG.

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## Recent Developments in the Cast Gold Inlay.

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By EDWIN SHOEMAKER, B.S., D.D.S., Philadelphia, Pa.

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(Read before the Academy of Stomatology of Philadelphia, May 25, 1920.)

I N presenting a so widely and frequently discussed subject as the cast gold inlay I desire first to make clear the point that contention for but little originality is being made. The conclusions other than those from the mass of established physical facts are drawn from experience gained by experimenting to a large extent with information gathered from quarters too numerous and incidental to name, as well as with ideas suggested by the work itself. Let us consider this, therefore, a working formula for the cast inlay, with particular emphasis laid upon laboratory procedure.

If the cast inlay technique were in the perfected stage of, say, the gold foil restoration there would be little need for thus prolonging the argument. It is patently otherwise, however, for inlays produced by the average haphazard method do not fit. If any one who uses an unstandardized laboratory technique doubts this he can settle the point for himself by preparing a compound cavity in an extracted tooth and making a cast inlay for it in 22-k. gold. It will be

found not to fit the cavity, unless by a most unusual chance certain definite requirements have been accidentally hit upon and followed.

To overcome the long-recognized discrepancy between the inlay and cavity numerous subterfuges have been resorted to. Double compound inlays have been made in two parts and soldered together; cavities have been prepared with curving outlines and rounded out floor and lateral walls to avoid the difficult though far more desirable rectangular form, and 24-k. gold has been used as being more adaptable than the harder but consequently more durable alloys. The results have been disappointing. The difficulties have considerably retarded development of the applications to which this most useful restoration may be put, and failure of the inlay to measure up to required standards has caused many conscientious operators to avoid its use entirely.

### IMPORTANCE OF THE LABORATORY.

As the cause of most of the distortion of the inlay is to be found in the labora-



tory we will start there. For the present let us presuppose an accurate wax pattern. The steps in its production will be rehearsed later. The reason for the distortion was ascribed to shrinkage of gold in casting, and let go at that. That there is something more concerned than shrinkage, however, becomes obvious when we realize that the coefficient of shrinkage for an inlay one-quarter of an inch in diameter is only 0.0016 (Ward, DENTAL COSMOS, 1909). In other words a mass diminution of 1.6 per cent., not 1/50; the naked eye hardly could detect it. Certainly that could not account for the gross misfits produced by the old methods. Recently it has been ascertained that the heating of the investment, the so-called "burning out" of the wax, is far more significant than the subsequent shrinkage of the gold.

A consideration of the composition of the investment material and the treatment to which it is submitted is interesting. The basis of all investment materials is silica, different grades as to fineness being mixed together, and plaster of Paris is used as the cementing material. Graphite sometimes is added as a filler for the interstices. The higher the percentage of silica in the compound the less are the volume changes and the greater the porosity, but the greater also is the roughness of the walls against which the molten metal is cast. Raising the percentage of plaster, on the other hand, increases the crushing strength and the fineness of detail, but lessens the refractory quality of the investment. Fortunately the manufacturers work out these details for us. Silica and graphite are unchanged by heat within the range used in our laboratories, but the plaster is definitely affected thereby, and therefore must be carefully studied in this connection.

Plaster of Paris, calcium sulfate, is prepared from native gypsum ( $\text{CaSO}_4 + 2\text{H}_2\text{O}$ ) by slow heating and so driving off one molecule of  $\text{H}_2\text{O}$ . The resulting mass is powdered. When water is mixed with this powder the lost molecule of  $\text{H}_2\text{O}$  is taken up and recrystallization takes place, the daily phenomenon

of setting plaster of our laboratories. Upon heating gypsum experimentally the first molecule of  $\text{H}_2\text{O}$  begins to be given off at  $175^\circ \text{F}$ . and is entirely eliminated at  $250^\circ$  or  $260^\circ \text{F}$ . If the heating is continued the second molecule is released and at  $480^\circ \text{F}$ . the sulfate rehydrates with difficulty, its affinity for water decreasing and its typical crystalline form being lost in direct ratio to the loss of the second molecule.

The cohesion of plaster depends upon its crystalline structure, and it is seen that thus overheating markedly reduces its crushing strength. As plaster is the cementing material of inlay investment compounds, the fallacy in exposing the investment to an indeterminate degree of heat immediately becomes apparent. In mixed investment there is a certain proportion of excess or uncombined "mechanical" water as well as the water of crystallization. Some heating is necessary to drive off, and to attain maximum porosity, the first molecule of combined water, as well as to obliterate the wax pattern.

The old method of heating the flask over an open flame often to redness developed because it was considered necessary actually to burn out the wax of the pattern. Taggart's wax melts at about  $145^\circ \text{F}$ . and boils and volatilizes at  $678^\circ \text{F}$ . To accomplish this burning out of the wax it was therefore necessary to raise the temperature of the flask to at least  $678^\circ \text{F}$ ., and in so doing incidentally to destroy the value of the plaster as a cementing material of the investment. The mold was softened and roughened, it cracked, and an indefinite amount of shrinkage and deterioration took place even before the gold entered it. The walls were made white and powdery, ill suited to receive the molten metal. The resulting cast was distorted and the gold surface was rough, oxidized, and coated with silica.

Recently it has been determined that contrary to being necessary to burn out the wax it is distinctly advantageous not to do so, not only from the standpoint of strength of investment, but because the walls of the mold impregnated with

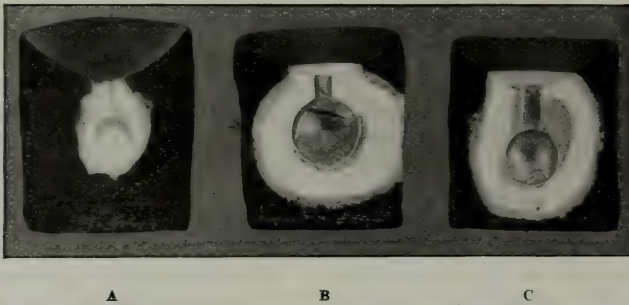


unburned wax have been found to be a perfect substance against which to cast molten gold. The wax impregnation acting as a true flux prevents oxidation and keeps the cast gold bright and smooth. It also increases the strength of the investment, already at its natural maximum because overheating has not taken place.

The investment is heated to a little more than the drying point then, and when dry absorbs the liquefied wax. The wax penetrates to a depth depending only on its mass, remaining in the immediate

are placed in it and taken out at the expiration of the predetermined time. A furnace may be made that is quite efficient and dependable. It is not at all necessary to buy one. It may be made in almost any form that permits of certain requirements. Mine is made of a tin box five inches square and seven inches high, lined with asbestos inside and out, with a removable top and a hole in the bottom for the small Bunsen flame. The top has two holes, one to admit the mercury bulb of the thermometer (laboratory thermometer reading to

FIG. 1.



Investments divided after heating for an hour and a half at 320° F. Three different sizes of wax are shown, the investments soaked in ink. The wax-impregnated investment nucleus around the mold is clearly demonstrated by the ink, which does not penetrate it. It is this wax impregnation that hardens and smooths the surface of the mold in casting and prevents oxidation of the gold.

walls of the mold, there to act as a flux for the molten gold. What occurs is analogous to the absorption of ink by blotting paper, small and large drops varying in the size of the spots they make but the density of each being the same. The divided flasks in the illustrations clearly demonstrate this point.

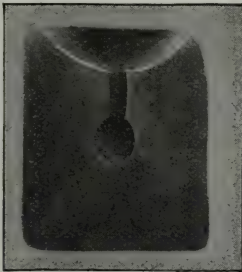
This result is accomplished by exposing the investment to a limited degree of heat for a definite period of time. Operators vary in the formula adhered to, but the principle is the same. At the present time the combination that seems to me to produce the best results with the small-sized flask is 320° F. for an hour and a half. That is, the furnace is heated to 320° F., then the investments

400° F., Arthur H. Thomas & Co., Lentz, etc.) and the other a vent for the escape of water vapor. About two inches above the hole for the flame is constructed a spreader so that the heat of the flame does not go directly upward and heat one flask more than another. About two inches from the top of the box is fastened a wire mesh platform to support the flasks.

After some manipulation the 320° F. point on the Bunsen gas cock may be determined. On putting the cold investments into the furnace the temperature will drop to a point depending upon their size and number. One will bring it down five degrees, three or four reduce it to 305° or 300° F. This is a

point to bear in mind and make allowance for in extreme cases. That is, if a number of investments are put in together, naturally more time is required to eliminate their contained water, and each investment is exposed to the desired amount of heat for a shorter period than if it were being heated individually. An extra quarter of an hour may be added to the time of the whole combination. This method permits of considerable variation without obviating the desired results. The main points to bear in mind

FIG. 2.



Investment divided after heating to redness.

Soaking this in ink discloses the absence of wax impregnation, as the ink has soaked through the whole investment. The wax has been vaporized by the high heat.

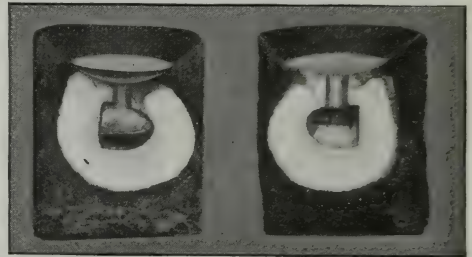
are to keep the temperature around 320° or 330° F.; under no circumstances allow it to be much higher for any length of time, and to make certain that the flame does not play directly on a single investment or the bulb of the high temperature thermometer. The spreader accomplishes this. The purpose is to heat the air of the furnace and let the air heat the investments and the thermometer alike.

If the heating has been properly carried out, after casting and removing the gold the remaining walls of the mold are seen to be black, the wax in the immediate mold surface being oxidized by the molten gold, and the inlay after being brushed off with a wet nailbrush is smooth and shiny, and shows the sharp details. No pickling is ever neces-

sary, and what is more important still, no fitting into the cavity. There has been no checking or cracking or distortion of the investment. The inlay will go to place with finger pressure or with the patient's biting upon a short piece of orange-wood stick placed upon it.

At this point it might be well to indicate that the above formula of 320° F.

FIG. 3.



A

B

Two halves of investment containing casting, divided and soaked in ink. The investment was heated for an hour and a half at 320° F., cast, and then divided and soaked in ink. The wax-impregnated nucleus is outlined by the ink. The cast A, Fig. 3, shows the bright, unoxidized gold, and on the excess button the darker line of oxidized gold appears continuous with the outline of the wax impregnation of the investment. B is the other half of the investment.

for an hour and a half implies the use of a small flask, much smaller than that usually supplied for inlay work, it being seven-eighths inch inside diameter and not exceeding one and three-eighths inches in length. If a larger flask is used the combination must be varied to allow more time for drying out the investment. This factor has been the source of trouble in some instances in which it was overlooked. It is not the size of the pattern, therefore, that changes the length of time the flask is exposed to the desired mean temperature of 320° F., but the amount of investment material the flask contains. A flask one and one-eighth by one and



three-eighths inches inside measurement, the smallest supplied with the Monson centrifugal machine, was found to require two hours' heating to produce the desired condition. At an hour and a half it was still liberating surplus water.

A small flask is an advantage when using the centrifugal machine, as the less the weight that has to be revolved, the more rapid the start. I am using flasks of light brass tubing of seven-eighths inside diameter and one to one and three-eighths inches long.

Now to rehearse briefly the points in inlay preparation as a whole:

#### THE WAX PATTERN.

In preparing the cavity one must bear in mind the unavoidable though slight shrinkage of the metal, the coefficient of shrinkage for a cast one-quarter of an inch in diameter of gold, as previously stated, being 0.0016, about one and five-tenths per cent. The axial walls incline and the lateral walls flare about ten per cent. That is, the two axial walls in a mesio-occluso-distal cavity incline toward each other to that extent instead of being parallel according to the older teaching, and the lateral walls instead of forming right angles with the cervical and occlusal floors are at an obtuse angle. The cervical and occlusal walls are flat. If properly executed this allows the wax pattern to be in apposition to the cavity walls only when fully seated in the cavity. Raising it the slightest extent makes space all around. The result is to minimize the effect of the shrinkage to the point of making it negligible.

My experience has been with only the so-called direct method of inlay preparation and therefore no attempt will be made to discuss the indirect other than to point out that given the ability to produce a perfect wax pattern, it would seem that there is less chance of failure in securing a perfect cast if the technique involving the fewer steps be used. As the name implies, in the former the cast is produced directly from the wax pattern of the cavity, in the latter a

modeling compound impression is made of tooth and cavity, an amalgam die is taken of that, and then the wax pattern is made from which the cast is produced.

The importance of securing a correct wax pattern cannot be overestimated, for no amount of care in the laboratory will avail if, for example, the tension caused by forcing the wax into the cavity has not been released by a hot point, or the margins, especially the cervical, have not been reached. Also it is well to emphasize the value of time spent in carving and finishing the wax, for if careful work is not done on the wax it must be done later with greater difficulty and to far less advantage upon the gold.

#### INLAYS FOR COMPOUND CAVITIES.

As at least ninety per cent. of our inlay work consists of compound cavities this type will be considered. Separation is effected as indicated. The matrix is always used; it greatly simplifies the manipulation of the wax. The Ivory No. 8 has been found entirely suited to the purpose. The wax is heated to the degree directed by the manufacturer. It is forced into the cavity with finger pressure which is instantly released, and a smooth, flat end plugger is used to tamp it down under its initial heat into the cervical corners and to the cervical margin. It should be worked as one does amalgam. The tamping will make irregular pits and hollows, and they are filled with fluid wax on a heated point. The point is thrust deep in the body of the pattern to release the tension caused by the earlier pressure of the finger and tamping. Fill the cavity overfull with the hot wax and while it is still soft have the patient close the jaws tightly together to mark the occlusal surfaces. Trim down the excess. The switchboard hot point is most useful for this, especially with a wisp of cotton twisted about a half an inch from the tip to absorb the excess melted wax. Carve the cold pattern to occlusion.

It will be found that burnishing the wax surface with dry bibulous paper occasionally while carving will greatly fa-



cilitate and direct the procedure. Bibulous paper is used dry in preference to cajuput or other wax solvent, as the dry burnished wax surface is more accurately worked than when the wax is soft and half dissolved. If the matrix is removed with the wax left in position, the approximal margins may be finished perfectly. The cervical margin need not be touched.

Carving in the mouth is the principal argument raised against the direct method in favor of the indirect. With a little practice, however, it becomes quite simple and easy. Carving and finishing the most complicated pattern cannot consume over fifteen or twenty minutes.

Remove the pattern with an explorer point, not with a sprue attached while in the cavity. There are two reasons for this: The sprue will spoil the carved occlusal surface,\* but more important still, you cannot detect slight undercuts, if existing, with so firm a handle to remove the wax. It must come out with absolutely no drag. If there is the slightest drag, the resulting inlay will not fit—this is an axiom. The least undercut causes distortion in the wax which is reproduced in the gold.

#### LABORATORY TECHNIQUE.

This brings us to the laboratory.

Attach the sprue to the approximal surface of the pattern. It is to be polished later anyhow, while the occlusal surface should not need to be touched. Paint the wax pattern with a fifty per cent. solution of alcohol. This will help in covering with the fluid investment. Invest according to the directions submitted with the compound that is being used. An investment containing no graphite is recommended. Graphite gives up its contained air slowly and tends to produce bubbles, and its high refractory quality is unnecessary in a low-heat technique. After pouring, avoid the least agitation while the investment is liquid, as motion causes gas or air bubbles to rise and attach themselves to the wax pattern. Allow the

investment to set from half an hour to an hour. It should not remain overnight, as the surplus water evaporates and so interferes with standardizing the laboratory technique. Also an air-dried investment is liable to check, while one properly heat-dried will not. When setting is completed remove the crucible-former and sprue with heat, and place, sprue-hole down, in the furnace. The sprue-hole should be kept down to prevent any bits of investment or other foreign body from falling into the mold.

The furnace technique has been elaborated.

For inlays 22-k. cast gold is indicated. It is resistant enough to the stress of mastication to prevent the breaking down of weak enamel margins and the obliteration of carving as occurs when 24-k. is used. It permits of a certain amount of burnishing. Do not attempt to use borax as a flux while heating the gold in casting. Sooner or later it will be drawn into the mold and so ruin an inlay. Remove oxid if present by heating the button and immersing in fifty per cent. sulfuric acid.

When metals are fused their typical crystalline arrangement is broken up and molecular activity is induced with a consequent increase in the bulk of the mass. On cooling, the crystals re-form and if allowed to do so slowly the molecules reset in the most compact arrangement. This shrinkage is minimized by sudden cooling and accentuated when it is prolonged. The desired procedure is to heat the metal just hot enough and to force it into the cold mold, thus inducing immediate congealing against the walls. Any factors that tend to prolong the congealing should be avoided—factors such as a hot flask, a comparatively slow blowpipe flame (which, of course, eventuates in a hot flask, if a method other than the centrifugal is used), heating the metal beyond the point necessary, and casting too large masses of metal. The essential points are a cold flask then, and if possible, an oxygen or nitrous-oxid blowpipe, or at least carrying the fusing through the first stages on a charcoal block to avoid heating the investment

when the compressed-air blowpipe is used.

Such shrinkage as does occur takes place in the direction of the largest mass of metal. In a mesio-occluso-distal inlay, for example, the principal shrinkage is toward the approximal portions of the gold, and in both directions away from the occlusal. This is the least fortunate result, as the casting is shortened and the axial walls drawn together. The inlay is thus prevented from going perfectly to its seating. Also the metal at the cervical margins shrinks toward the larger mass above it. The means by which this undesirable factor in the casting process may be minimized have been set forth. In difficult mesio-occluso-distal inlays it is often advisable to carve a layer of wax from the surfaces of the pattern approximating the axial and occlusal walls and so facilitate adaptation of the cast to the cavity.

Despite manufacturers' claims and the habit of mind that has led us to accept them on faith, all casting machines are not perfect. The pressure machine depending upon generated steam introduces an undesirable variable in the cold, wet pad being forced upon the molten metal. The degree of cooling of the metal and the amount of pressure exerted to force it into the mold are also impossible to determine; the machine is also uncertain in its action. The compressed-air apparatus eliminates these difficulties. Both, however, involve the disadvantage of heating the investment while the gold is being fused.

The suction machine, if there are no leaks, enables us to make the pressure factor definite. It exhausts the air in the mold to a definite point and so causes that amount of atmospheric pressure upon the molten metal over the sprue-hole. A perfect vacuum exists above a column of mercury about thirty inches high in a sealed tube, the lower end open. It is the measure of the atmospheric weight or pressure and equals about fifteen pounds to the square inch. Mechanical suction pumps can closely approximate it and so cause thirteen or fourteen pounds per square inch to be exerted

upon the molten gold. Thus by gaging air exhaustion, measured in inches, the pressure is definitely determined. An advantage is claimed for this method in that the air in the mold is removed ahead of the incoming molten metal instead of by it. The disadvantage, however, lies in the limitation of the pressure to thirteen or fourteen pounds. This seems to be insufficient for casting thin bands, although it is more than is required for inlay work and cast clasps. For suction casting, the investment should be somewhat more porous than for pressure.

The centrifugal principle differs from the others in depending upon the weight, the inertia of the molten metal itself, and the force *vis a tergo* of the excess button. Its weight is transmitted as force by being held to a curved path when in rapid motion with the revolving flask—the so-called centrifugal force. The flask and gold both revolve and the result is to project the gold outward and so expel the air and fill the mold. The centrifugal machine alone permits of melting the gold without heating the flask. It produces compound castings—so perfectly reproducing the pattern that when placed in technique teeth the shrinkage is hardly visible. Such has not been the case in my experience with either the suction or pressure apparatus.

In developing a technique using the centrifugal machine certain difficulties were encountered. These were overcome by varying somewhat the accepted methods. It was found that the results of the comparatively slow starting hand-turned apparatus were improved, especially as to edge sharpness, by using a large sprue, B. & S. No. 9, bluntly pointed, and adopting a funnel-shaped crucible-former in preference to the comparatively flat, hollow type in general use. Small flasks are recommended. The machine is revolved as rapidly as possible. In a word, anything is desirable that facilitates the rapid, unobstructed entrance of the gold into the mold.

There are certain troubles peculiar to inlay technique. It might not be out



of place to enumerate the principal ones and as far as possible to give the causes. The following are apparent when the investment is opened:

(1) Excess metal button separated from the cast, the divided ends of the sprue rounded, due to loss of pressure. The initial force upon the molten metal has not been maintained. This is common where steam generated by contact of a wet surface against the hot metal supplies the available pressure.

(2) Sprue not divided, but the whole cast tending to the globular form, due to insufficient initial pressure sometimes, but usually to not heating the gold sufficiently.

(3) Cast true to pattern except for the edges, which are uniformly if slightly rounded, due in pressure casting to insufficient heating of gold. This is the only fault that developed in the centrifugal technique and is due to insufficient heating of the gold and to partially obstructed entrance of the molten gold into the mold.

(4) Lower edges of cast sharp and perfect, those toward sprue end rounded, sprue unseparated, due to insufficient heating of gold. This result is peculiar to the suction apparatus.

(5) Hollowing out of one surface of the cast while the other is perfect with sprue separated is due to the loss of pressure.

(6) The surface of the gold appearing crystalline and etched is due to the gold being too hot on entering the mold, burning the surface of the mold, and solidifying against the roughened surface.

(7) Thin projection of edges; a feathering of gold beyond the cavity limits is due to cracks and checks in the investment caused by overheating, air drying, or too great pressure.

(8) Difficulty in getting the gold all the way around the mold of a band or other thin, flat casting is due to insufficient pressure. Such work requires more pressure than that characterized by

greater relative cross section such as the usual inlay. The pressure within the investment upon the molten metal moving toward the limiting walls of the mold varies in direct ratio with the cross section. Thin, flat pieces with small cross section allow a greater proportionate drag of the metal to the walls, and so the high molecular tension of molten metal becomes a practical factor.

To one who has not followed them in his work the foregoing procedures and requirements may at first seem overly complicated and exacting. In reality inlay technique is remarkably simplified by them. The time and effort spent in thus standardizing one's method are many times repaid in satisfaction with results accomplished. Indeed, the study of the subject is so interesting that it is more than worth while in itself, and the almost limitless possibilities of the cast gold inlay leave little excuse for our not perfecting as far as possible this most fascinating of restorative methods.

Since this paper was read a casting machine has been developed on the basis of the Norman L. Jameson machine which operates directly upon the shaft of the lathe motor. Fastening the casting ring rigidly upon the revolving arm and using a crucible upon which to melt the gold avoids heating the investment. The sudden and rapid start of the motor-driven machine obviates the necessity of overheating the gold. The gold is just melted and no more, and its then comparatively low temperature allows much lower drying-out heat of the investment. The investment for this machine is heated for an hour and a half at  $270^{\circ}$  F., resulting in a mold of considerably higher crushing strength than that heated at  $320^{\circ}$ . The castings are perfect as to surface and edge sharpness and the lower heating of the gold points toward minimizing shrinkage.

1834 SPRUCE ST.

[See also *Discussion*, as reported under "Proceedings of Societies," this issue.]



## Orthodontic Education.

By A. LE ROY JOHNSON, D.M.D., Boston, Mass.

(President's address delivered before the annual meeting of the Eastern Association of Graduates of the Angle School of Orthodontia, New York City, May 3 and 4, 1920.)

**T**RADITION gives me the honor of welcoming you to the eleventh annual meeting of the Eastern Association of Graduates of the Angle School. I do this most heartily. Tradition also gives me the privilege of addressing you. This is a favor I accept as an obligation. While the time-honored custom directs me to review the events of the year and to suggest ways and means of strengthening the organization of this Association, today I propose to depart from the established order and open a subject of particular interest to all concerned with the future of dental science—I refer to the question of orthodontic education with special reference to its place in the undergraduate curriculum.

In the question of orthodontic education we face a vital problem. The directors of dental education, the State, as well as the future of orthodontia, demand the consideration of this problem. The time has come when definite steps will be taken to effect its solution, and it is better that it be done by those who from experience and study are best fitted for the task. It is, in fact, our problem, and from its nature our attitude toward it will materially affect the progress of dentistry.

During the first periods of its growth a tree develops faster when given special care than it does when treated as one of a general vegetation left alone to the play of natural forces. But there comes a time when the fullest development of its possibilities is dependent upon adjustment to its surrounding conditions. Although even then enhanced by nursing and intelligent care, the growth and de-

velopment of the tree are in the main determined by its relation to the general organization of living things. So with orthodontia; it has passed through the first stage of its evolution where it developed best treated individually as a separate and distinct entity; it has arrived at its present state of development through the influence of the so-called "postgraduate" schools, special schools founded for the purpose of teaching orthodontia and conducted with little regard for the established courses of medicine and dentistry. Such schools have nursed this growing chapter of science through the period of its infancy, and so have contributed an essential element to the future. But the time has come when further progress in the development of orthodontia depends upon the recognition of the place of this science in the accepted systems of education.

The belief is often expressed among those who have devoted much time and study to the correction of maxillary deformities that postgraduate training is essential to one who is to do such work. Yet little is heard of undergraduate preparation. Strictly speaking postgraduate work is time devoted to specialized study; to a problem of research followed by the presentation of evidence in the form of a thesis for a master's or doctor's degree, depending upon the nature of the work and the time involved. More liberally interpreted postgraduate work is time devoted to special study; to the development of technical skill; to clinical experience and observation as well as to a problem of research. In either case postgraduate work implies

undergraduate training in the basic principles upon which such work rests.

The undergraduate schools of the country taken as a whole show a striking lack of uniformity in the courses they are giving in the name of orthodontia. Some pay little serious attention to the subject; others are devoting all effort to instruction in the mechanics of tooth movement, apparently believing that to know how to move a tooth is sufficient reason for doing so; while there are a few schools trying to present the fundamentals of the science upon which a superstructure of postgraduate work can be built that will qualify the specialist. In the face of such chaotic conditions in the schools, the State recognizes the graduate dentist as a competent orthodontist. This means that for the near future at least the ranks of orthodontists will be recruited from the dental schools. Thus is the question of undergraduate instruction in the science of orthodontia a most practical one. The reorganization of the curricula of the schools due to the lengthening of the course of study makes it most opportune at this time.

My contention is that a knowledge of the fundamental principles of orthodontia is essential to a philosophic view of the basic truths of general dentistry, and also that it is only by teaching the fundamental principles of orthodontia in the undergraduate schools that postgraduate work can be organized which will contribute substantially to the development of the science. Although the belief is quite generally expressed that the fundamentals of orthodontia should be taught in the undergraduate schools, there is evident a difference of opinion as to what constitutes the basic material of the science.

The following is an outline, a synopsis, of the subject matter of the science which I believe to be fundamental, and as such should form the groundwork of the course in the undergraduate school. No reference is made to the technical and clinical training of the student, the attempt being to designate the material of science which is the groundwork of orthodontia. Since the viewpoint will

be considered by many of you as unorthodox, it seems advisable to speak more in detail than would otherwise be necessary in addressing an audience of this character upon any phase of dental work.

Dentistry is a part of medicine. Orthodontia is a part of dentistry. Some believe that orthodontia is a part of orthopedic surgery and that dentistry is a part of medicine. They would not recognize orthodontia as a branch of dental science. Obviously such a division puts a very limited and arbitrary interpretation upon the scope of both medicine and dentistry. The future will undoubtedly modify the relative status of all branches of medical science. We may and should have theories which are ideal, but after all we are concerned with the facts of today. Our ideals are worth while in the degree that they are relevant to present conditions. As said before, the State recognizes the dentist as an orthodontist. Moreover, orthodontia has grown out of dentistry; it is based upon knowledge that is fundamental in dentistry and with dentistry constitutes a distinct branch of medical science. Thus it seems most reasonable to maintain that orthodontia is a part of dentistry. This being true, to define orthodontia is to tell what part of dentistry it is. A brief review of the history of general dentistry, bringing out the tendencies which have resulted in the development of orthodontia, is introductory to the definition of this branch of science.

#### DEVELOPMENT OF ORTHODONTIA.

History can be presented in two ways, either as a catalog of the chronological order of events or as an interpretation of tendencies. It used to be enough for historians to simply catalog the facts presented. They did not suspect the need nor did they realize the advantage of analyzing and comparing the vast accumulation of material at their disposal: to arrange it in chronological order seemed sufficient. In much the same way many make the history of dentistry little more than a review of early records.



citing the dates of inventions and discoveries and the names of the persons associated with them. Although fascinating to a few, the material of dental history treated in such a way is of little practical value except in so far as it furnishes a groundwork for the consideration of the trend of circumstances. The practical utility of history is in classifying and systematizing the events, changes, and developments of the past in such a way that the laws revealed furnish a basis for the interpretation of present conditions and an indication of the probabilities of the future. So a study of the history of dentistry will make clear the development of knowledge which opened the field of orthodontia and will help to point out its place in dental science.

The history of dentistry clearly indicates a progressive tendency toward the appreciation of the physiological nature of dental problems. During early periods the treatment of the teeth was believed to be predominantly a mechanical matter. A carious tooth was filled with gold, a metal, or the tooth was mechanically removed and replaced by a metallic or porcelain substitute. Even the idea of prevention expressed itself in a manner of mutilation, the approximal surfaces of the teeth being filed away in an attempt to prevent the extension of caries. The vision of the dentist seldom went beyond the individual tooth or those immediately adjacent. But gradually the viewpoint changed, and pure mechanics gave way to physiologic evidence. The effect of mutilation upon the form of the arch as a whole was noted. The teeth became the unit of the series; the series an interdependent part of the masticatory apparatus, and this a mutually dependent part of the whole individual. The dental problem instead of remaining merely the mechanical consideration of the disposition of the individual tooth, became a study of the teeth in their relation to the life processes of the living organism as a whole.

This extension of dental vision from the individual tooth as a unit to the

masticatory apparatus as a whole marked the dawn of the realization that dentistry is primarily concerned with a physiological problem rather than a mechanical one. While a knowledge of mechanics will always have an important place in dental science, we no longer attempt to employ the principles of mechanics alone in the study of dental problems. In the ultimate, the determining factor is now recognized as the consideration of the activities, processes, and phenomena incidental to and characteristic of living tissues.

Today the purpose of dentistry is to assist in establishing and maintaining the normal functional activity of the masticatory apparatus—a part of the living organism. The natural forms and relations of the teeth are preserved and restored in order that the normal functional activity of the masticatory apparatus may be realized. The filling of a tooth, the treatment of an alveolar abscess, the construction of an artificial substitute, or the development of the supporting structures of the teeth by artificial means, in fact each and every operation pertaining to dental structure is governed by the same purpose, *i.e.*, to restore the normal functional activity of the masticatory apparatus. And it is because of the fact that the functional activity of the masticatory apparatus as a whole is the criterion of all dental operations that the subject matter of the science of orthodontia is an essential part of the undergraduate curriculum.

The definition of orthodontia ordinarily given is that "it is the science which treats of the correction of malocclusion of the teeth." In such a definition there is a suggestion of the fact that the subject matter of orthodontia is a part of dentistry, but as a definition it does not convey a true idea of the science in its present state of development. Although designating the character of a large part of the work that is being carried on in the name of orthodontia, the definition does not identify the nature of the science as it is now understood. To say that orthodontia is "the science which treats of the correc-



tion of malocclusion" places all emphasis upon the occlusal relations of the teeth, and conveys no idea of the more vital factors which constitute the very essence of the science. Malocclusion is evidence of the perturbation of the physiologic processes, perhaps of natural disharmonies. At least it expresses phenomena more fundamental in the organization of an individual than merely the physical relations of tooth surfaces. The whole realm of clinical experience confirms this view, and bears evidence to the fact that a definition which conveys a true idea of this field of work must designate a wider sphere of phenomena than merely the occlusal relations of the teeth.

#### DENTAL ORTHOPEDIA.

The value of a definition is to make another understand what the word defined stands for. But as Josiah Royce once said, a definition, simple, positive, hard and fast as it is, never tells the whole truth about a conception. Hence, rather than put too much emphasis upon the form of a definition of orthodontia it is better to give an exposition of its scientific and philosophical position. In so doing, refer to the science of orthodontia as dealing with the functional activity of the dental arch as a whole and with the laws which underlie its growth and development. Refer to it as dealing with the functional interaction of the teeth, their supporting and surrounding structures, and the organism as a whole. More specifically perhaps, refer to it as the science which treats of the forces controlling the form of the dental arch, and describe it as that part of dentistry concerned with the deformities of the dental arch which interfere with its normal functional activity. Undoubtedly, dental orthopedia would be better terminology; it is more exact, and for this reason more truly identifies the field of work. Yet in view of the traditional aversion to a change of name we hesitate to suggest that dental orthopedia replace orthodontia. Nevertheless the nature of the orthodontic problem demands that we think in terms of dental orthopedia;

that we broaden our vision and look through and beyond the phenomena of occlusion to the life activities of the dental arch as a whole.

Thus is the conception of the normal dental arch fundamental in the study of the science of orthodontia. The same is true in all aspects of dental science, in oral surgery and pathology, in periodontia, prosthodontia and exodontia; in whatever branch you will, the first and most fundamental problem is to evolve a scientific conception of the normal dental arch of the living human organism.

There is a tendency among orthodontists to study the dental arch from the viewpoint of the anthropologist. For example, they limit their conception of the dental arch to the curved alignment of the teeth, saying with the anthropologist that "the arch is what the teeth have made it." Moreover, their conception of normal is a standard of type. They forget, apparently, that orthodontia is one thing and anthropology another. Anthropology is concerned with the chronological, racial, social and even pathological groupings of man, while orthodontia is concerned with the life processes of men as living units. Anthropology deals with man collectively; orthodontia deals with men individually, the anthropologist studies the dental arch of man as a morphological characteristic, which enables him to determine the place in the history of mankind of a particular group of individuals. In anthropology the student gains a knowledge of the phylogenetic value of the teeth, but the correlations emphasized by the anthropologist and of interest to him in the study of groups and the conception of types may be misleading to the student of orthodontia concerned with individual variations.

The orthodontist studies the dental arch as a part of a living being. To him it is a physiological rather than a morphological correlation. He realizes that the teeth express but a part of a complex of forces which determine the form of the arch. The teeth, osseous, nervous, vascular, and muscular tissues

of the face and jaws intermingle and blend into one another and are controlled in their mutual relations by the more dominant influence of factors involving the entire organism. From the fact that the dental arch is a living part of a living thing a dogmatic definition of it should not be given. The line of demarcation between the dental arch and other parts of the living organism is not absolute. All tissues blend through an intermingling of structural elements, while the central nervous system and the circulatory system, the avenue of the internal secretions, maintain the fundamental unity of the organism as a whole.

#### RELATION OF MORPHOLOGY AND PHYSIOLOGY.

Since orthodontia is essentially a study of form development an exposition of it necessitates the definition and differentiation of morphology and physiology. Biological research of recent years has resulted in a transformation of the old ideas of the relation of morphology and physiology. Once considered as more or less foreign to each other, they are now coming together on common ground. In fact, the belief is growing that a knowledge of either physiology or morphology taken of itself alone is of little value as a basis for treating the living organism, and especially is this true in regard to studies of development. A knowledge of the structural form of a bone or muscle or gland is of little consequence unless associated with it is a knowledge of the relation these characters have to the functional activities of the part during life. So a knowledge of the anatomy, histology, or embryology of the teeth, peridental membrane, alveolar bone, and surrounding muscle is of little value to the practical dentist without an appreciation of the interdependent relation of the life phenomena of these parts.

In dental and medical education fundamentals are often referred to as a knowledge of anatomy, histology, embryology, or the physiology of the neuromuscular mechanism. But that which in truth is fundamental, that which

does in fact constitute the basic knowledge upon which to build the superstructure of specialization, whether of dentistry, rhinology, neurology, or any part of medicine, is the knowledge of the interdependent relation of living tissues; the fundamental unity of life phenomena. Muscle, tendon, bone, bloodvessels, and nerves all live as one; change one and you change all. To know how a bone is changed in its structural form by physiological processes and how dependent such processes are upon the nature of the structures involved is knowledge that is fundamental in the science of all medicine. Each science is valuable, a knowledge of each is essential, yet each one sees but one aspect of the phenomena of life. It is in bringing together in one concept the evidence of all that the real nature of living tissues is revealed. Morphology and physiology, while being distinct branches of science, should in the ultimate be treated as one.

In the study of the science of orthodontia the dental arch is treated as a whole. The science takes into account the morphological characteristics of distinct tissues, and also the relation the different tissues and elements bear to each other and the way they act and are acted upon by each other in life processes. It brings into one concept the different structures treated in dental science, and for this reason is necessary to a philosophic understanding of the basic truths of general dentistry. Philosophy signifies a concept of unity and variety. The study of the different sciences presents the variety; the study of the interrelation of the different sciences presents the unity. The point of view of the science of orthodontia is of the unity of dental phenomena, hence the knowledge pertaining to it constitutes an essential part of an undergraduate curriculum which assumes a philosophic purpose.

#### ORTHODONTIA AS A SCIENCE.

From an analysis of the nature of the field of orthodontia and an attempt to indicate its place in dental science con-



sideration is given to its organization as a science. It is important, however, to preface this with a detailed description of the means and methods of obtaining scientific data, and also with an explanation of the meaning of the words and phrases which symbolize the logic upon which the organization of the science is built: I refer to such words and phrases as science, natural law, qualitative and quantitative analysis, hypothesis, type, and normal.

A science literally defined is "Knowledge which has been systematized and formulated with reference to the discovery of general truths or the operation of general laws." A general truth is a proposition which sums up actual experiences, and all knowledge relative to it goes to make up the subject matter of the science of which the general truth is the basic principle. Thus the sciences of mechanics, physics, and chemistry generalize the laws of the relations to which matter and motion conform. Biology is a science, and treats of living organisms. The general truth upon which it is founded is the fact of life upon this earth, the reality of living organisms, and all knowledge of living organisms, all knowledge of the phenomena of life, goes to make up the subject matter of the science of biology.

In the same way the science of orthodontia must conform in its organization to the conventional standards of science in general; it must be founded upon a general truth or the operation of a general law, and the material pertaining to this general truth must be so systematized that each new development will appear in logical sequence.

#### THE LAW OF OCCLUSION.

The general truth or natural law, as the basic principle of an organic science is called, upon which the science of orthodontia is founded is the law of occlusion. From the observation and comparison of organisms of many species there is evident a certain uniformity of phenomena as regards the growth, development, and structural relations of the masticatory

apparatus. From the lamprey eel down through all successive forms of animal life known to have a masticatory apparatus, including the dolphin with the simple conical tooth crowns and the elephant with the highly specialized dentition, throughout all these there is an order of sequence so invariable under normal conditions that a uniformity is readily recognized. In organisms exhibiting the most diversified forms of teeth there is a characteristic common to the majority, which is that the goal of the growth and development of the dental arch is to bring the crowns into some form of mechanical relation which will best serve the needs of the individual organism. This mechanical relation, this transient approximation of tooth surfaces, is called occlusion, and the uniformity of its appearance in nature is referred to as the law of occlusion. Thus the general truth about which the knowledge of the evolution of the dental arch is systematized and formulated into a science is the law of occlusion.

In the organization of the subject matter of the science of orthodontia a knowledge of occlusion is first in order. The teeth are the primary factors in the evolution of the dental arch, and the principal function for which they exist is in the physical relations of their crowns. Moreover, the occlusal relations of the teeth are in a degree indicative of the developmental condition of adjacent structures—all of which designates the study of occlusion as the logical introduction to the material of orthodontia.

#### HYPOTHETICAL OCCLUSION.

The subject of occlusion is handled in the following way: (1) Hypothetical, (2) typical, (3) individual; the object being to approach in a logical way the question of normal occlusion of the individual organism.

In the consideration of hypothetical occlusion we begin by defining the word *hypothesis* in detail, and show that in the study of occlusion a hypothesis is as necessary as it is in other fields of investigation.



The formula of the ideal arrangement of the occlusal inclined planes of the teeth, so often described as normal occlusion, is given as the hypothetical scheme of occlusion which serves as a basis of comparison in the attempt to determine the real nature of the occlusal relations of the teeth of human beings living today. This ideal scheme of occlusion is substantiated as a hypothesis (1) in the law of occlusion; (2) in the form of the occlusal surfaces of the teeth; (3) in the harmony of tooth form, character of occlusion, and species. The law of occlusion testifies to the fact of some form of mechanical relation of the teeth that will best serve the needs of the individual organism. The design and plan manifest in the structural form of the occlusal surfaces of the teeth signify a scheme of relation of a more or less constant and definite nature. And the correlation of the forms of the teeth, the character of occlusion and the race or group to which an animal belongs, a fact so evident in comparative anatomy, suggests a form of occlusal relations distinctive for man. The study of this hypothetical scheme of occlusion emphasizes to the student of dentistry typical tooth forms and their relation to each other in a most effective way, but it should be made clear that such an ideal arrangement of the teeth is no more than a theory which has sufficient basis in fact to justify it as a hypothesis in the study of actual conditions.

#### TYPICAL OCCLUSION.

In the consideration of typical occlusion we begin with an exposition of the meaning of the word *typical*, showing the relation of the hypothetical to the typical and the significance of the typical in the study of the individual.

Type is of the nature of an abstraction. It is the result of bringing together, of combining in one concept a variety of structural relations, each different from the other, no two alike. Type refers to a composite. It is not a concrete thing existing in natural form. It is a model

or pattern from which each individual presents some degree of variation. Hence it cannot be applied to the individual as a specific standard of normality. The hypothetical scheme of occlusion is a condition assumed as a basis from which to determine the typical occlusion of a race or group of individuals. How near the typical occlusion of human beings living today is to the hypothetical scheme of occlusion we do not know. In order to determine this a systematic investigation of the occlusal relations of the teeth of many hundreds of the children and adults in the common walks of life would have to be made. Such an investigation is of course a difficult one, nevertheless it must be done if we are to have a scientific guide in the study of the individual. For even though it be assumed from the evidence of prehistoric specimens that an ideal condition of occlusion was born into the race, we do not know in what degree it is typical of man today.

Inasmuch as many individuals have not survived to maturity and that development has been influenced by new combinations of physiological units and by environment, it is reasonable to suppose that more definite knowledge of conditions now existing would necessitate a modification of the belief that the ideal occlusion is typical of this generation. You remember Helmholtz says regarding the eye that "Nature seems to have packed this organ with mistakes, as if for the avowed purpose of destroying any foundation for the theory that organs are adapted to their environment." "And yet the eye does very well for most of us, and we are thoroughly happy in the possession of this structure whose lenses are not exactly curved and centered." Hence we emphasize the fact that the guide in the study of the occlusion of the teeth of the individual organism is the condition of occlusion which is typical of the race or group to which the individual belongs, pointing out the inconsistency in the belief that a theoretical scheme of occlusal relations, even though it has a basis in actual evi-

dence, can be utilized as a measure of individual conditions.

#### INDIVIDUAL OCCLUSION.

The consideration of individual occlusion opens a wider field of phenomena. In fact, it brings us to the real problem of orthodontia, which is the question of the individual normal.

The problem of the individual normal is in reality a problem of normal variation as it refers to the dental arch of the living human being. The study of the individual normal involves an exposition of the meaning of *normal*, and also of the material of science relative to the phenomena of *variation*.

Normal refers to a standard or rule which is observed or claimed to prevail in nature. In morphology the standard referred to is determined by the constancy, the prevalence, the frequency of the occurrence of a condition in the different organisms of a group or species. But when the object of consideration is the relation of an organ or part to the individual organism the standard to which normal refers is a different kind, yet even then it designates a standard as truly as it does in the group or species sense.

The standard referred to in this instance implies a criterion of a functional nature. It refers to a condition which is most effective in maintaining in its most stable form the organization of the living being. Observation of the occlusal relations of the teeth of an individual enables one to ascertain in what degree the condition of occlusion approximates the typical. The occlusion of the individual will never be the same in all particulars as the typical, since type is not a fixed point but is an abstraction determined by the extent and direction of individual variations. In the species sense the occlusal relations of the teeth of the individual are said to be normal in that they come within the range of variation characteristic of the majority of the members of the race or group to which the individual belongs. They are normal in the sense that they possess

many of the characteristics expressed as typical. But in orthodontia we are concerned with the welfare of the individual organism; we are more directly concerned with occlusion in its relation to the individual organism as a whole than with its relation to occlusal conditions of other individuals.

Our problem is to determine in what degree the occlusal relations of the teeth and the form of the dental arch of the individual can vary from that which is characteristic of the species and yet express the condition most favorable to the growth, development, and life processes of the organism as a whole. It is a question of normal variation. And the standard to which normal refers in a consideration of the parts of an organism in their relation to the whole is of a functional nature, not a fixed concept of structural form and relations. The collective or species normal is our basis, our guide, our ideal in the study of the individual, but it should be made clear that the question of the normal as it refers to the relation of a part to the whole involves a study of life processes of the whole individual.

The phenomena most relevant to our particular problem are included under the heading of variation. The study of variation implies a consideration of the constitution of living matter and of its manner of growth and differentiation. Inasmuch as a large part of the elementary material, especially as regards the internal causes of variation, is covered in other courses, notably in histology, pathology, and embryology, we do not attempt its presentation. It is more in keeping with the place of this science in the undergraduate curriculum to handle the material of variation in its broader phases.

Variation is the name given to the phenomena of differences between organisms. In treating the subject it is well to recognize the formal distinctions in classes of variations, *i.e.*, the generally accepted divisions based upon differences between the nature of variations and the manner of their occurrence. As regards their nature they are referred to as qual-



itative and quantitative; as regards the manner of their occurrence as continuous and discontinuous. There are many classifications in the literature, but this one seems to introduce the subject in its simplest form, and indicates the field to be covered in the study of the normal—the basis of diagnosis and the guide in treatment.

An appreciation of the significance of the law of variation involves the consideration of the following subjects: The phenomena of habit and adaptation, treated as fundamental characteristics of living tissues; heredity, as it refers to the transmission of modifications; the interdependence of function and structure; the influence of food upon variability; evolutionary tendencies, dealing especially with the law of economy of growth; as well as other groups of phenomena, all of which form the groundwork for the study of normal variations and deformities.

This in a general way is an outline of the material of science which I believe to be fundamental in orthodontia. It has a place in the undergraduate curriculum because such knowledge is basic in the practice of general dentistry. In order to realize the effect of mutilation of the teeth upon the functional activity of the dental arch one must know something of the forces which control its growth and development; in order to

build mechanical restorations which will pass the test of practical utility one must know something of the interdependent relation of living tissues; in order to recognize developing deformities one must know something of the nature of normal variations, and it is in the study of the fundamentals of orthodontia that the student of dentistry derives such knowledge. Moreover, the presentation in the undergraduate schools of the subject matter of science here outlined as fundamental in orthodontia will make possible the organization of real postgraduate study which will contribute to the growth of the science. The student will be better able to judge of his fitness for the work, and graduate schools will have a basis for entrance requirements which will eliminate the necessity of giving much of the elementary material now consuming time which should be devoted to clinical experience, observation and research. Postgraduate work is essential to the growth of the science and the qualification of the specialist, yet undergraduate work is of primary importance to each, and until this is realized the material enrichment of the science and personnel of the profession will be slow indeed.

125 MARLBORO ST.

[See also *Discussion*, as reported under "Proceedings of Societies," this issue.]

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# Articular Rheumatism in Connection with Oral Infection.

By THOMAS E. PROSSER, D.D.S., E. St. Louis, Ill.

PROBABLY the most important advance in medical science in the last quarter century has been among the diseases of the oral cavity and the part they play in connection with other diseases of the human body.

Conservative scientific medicine has awakened to the fact of the dire results of an infected mouth on other parts of the human structure, and of the great necessity of serious consideration and treatment in eliminating the focus of infection.

The senior and foremost men in the practice of dentistry and medicine have shown conditions all the way from gout to cerebral diseases resulting from or seriously affected by infections of the oral cavity.

Probably the most prominent of these systemic conditions resulting from oral infection is articular rheumatism.

There have been various theories as to the nature and cause of rheumatism. First, that it was due to presence of excess of lactic acid in the system; second, that it was of neuropathic origin. Still later on many claimed bacteria as the cause, the diplococcus having been isolated in many cases. However, I believe in all cases of rheumatism resulting from infections of the mouth, where I believe seventy-five per cent. of all rheumatic conditions originate, that the rheumatic condition produced in the joints is not due to the lodging of bacteria in the articular spaces, but to the toxins produced by the bacteria. The lymphoid tissues with their power of infiltration allow the toxins to pass through and stop the bacteria, and in due time we get a local intoxication starting first in one joint, and then, as the system keeps receiving the charge of septic material

from its focus, the intoxication increases, and we have many joints affected.

Acute articular rheumatism resulting from oral infection may come on suddenly after body resistance has been lowered by some other ailment, allowing the successful invasion of the accumulated bacterial toxins. Second and third attacks are common and in time, if the focus of infection is not eliminated, will result in chronic articular rheumatism.

In chronic articular rheumatism the affection is usually polyarticular and the joints may be heard grating upon one another, due to the absence of synovial fluid. There is not as much swelling in the chronic cases as in the acute.

## TREATMENT.

In the treatment of these cases a severe examination is given. A Wassermann test is taken, blood color, blood count and blood pressure also taken. A microscopic examination of pus specimen from the focus is made. Red blood cells are usually greatly diminished, hemoglobin low, blood pressure usually above normal; urine usually high colored, high specific gravity and acid sometimes containing uric acid crystals. Examination of pus usually shows staphylococci and streptococci in abundance.

In all rheumatic cases resulting from pyorrhetic infection, the writer's first operation toward local treatment is the cleaning of all the teeth as thoroughly as possible with brushes, rubber disks, and cups. Having accomplished this, the work of removing thoroughly all the deposits and calculus begins.

The accomplishing of this operation successfully requires exacting technique, and at least one half-hour should be

spent on each tooth in severe cases. However, waste no time on hopeless teeth; remove them and assist those less severely affected toward recovery.

The patient is taught the proper use of the toothbrush, for his coöperation in the treatment plays a major rôle in the stemming of the infection. The writer has used with good results a solution of camphenol injected into the pockets about the teeth, also a solution of iodine, aconite, phenol and glycerin. The gums are massaged very thoroughly at every treatment, and the patient instructed also to massage them.

As to those cases of rheumatism fostered by proliferated periodontitis, many men both in the dental and medical professions have become rabid on the subject of extraction of these abscessed teeth, and remove or order removed all teeth that show any signs whatever of rarefaction at the apices. The writer strongly condemns such practice. Many or most of these cases should be given a fair chance by treatment before removal of the teeth.

The writer has treated cases of apical abscesses where the X-ray film showed considerable rarefaction until a negative culture was obtained from the root of the tooth; the root canals were then filled, the apical area again radiographed, and rarefaction still present. The area was radiographed again six months later and all signs of rarefaction had disappeared, due to the formation of more bone cells.

However, in all these cases of systemic toxication from oral infection, local treatment alone is insufficient. Something must be done to facilitate the system in throwing off these toxins, and for this purpose the writer administers potassium iodide. This alternative acts as a specific in eliminating all toxins from the system, and produces a high-grade barricade to those that further try to enter.

#### CASE REPORTS.

The following cases are a few of the more severe ones treated:

CASE 1. Mrs. McC., age thirty-two, married, two children, suffered from severe rheumatism, strongly resembling arthritis deformans; lower limb affected, feet turned severely inward. Examination of mouth showed two broken-down upper third molars with pus flowing from around them; lower anterior teeth pyorrhetic. Examination of pus showed staphylococci in abundance. Red blood cells greatly diminished. Third molars were removed and rheumatism flared up severely for forty-eight hours. Patient put on potassium iodide three days later and in ten days practically all pain had disappeared from limbs and patient was able to walk again. Pyorrhea treated. Patient has had no trace of rheumatism since. Lapse of time since last treated, three years.

CASE 2. Mrs. H., age forty, married, eight children, suffered from acute rheumatism. Severe pains in limbs, also back and arms. Examination of mouth revealed twenty-four teeth and these very much "over dentistried" with shapeless crowns put on by one of the greatest detriments to mankind, the "advertising dentist." No mercy was shown this case, and every one of the twenty-four teeth were extracted under nitrous oxid. The patient's rheumatism began to subside in five days, and in twenty-one days had entirely disappeared and has never since returned.

CASE 3. Miss C., age twenty-one, single, suffering from severe rheumatism for a period of three years. Baths at various springs relieved pain for short time, only to return worse than ever. Wassermann examination negative. Examination of mouth showed no infection of tissues whatever superficially. However, radiograph showed distinct dark area at apex of lower right first molar, which had been devitalized and filled. Filling removed and tooth treated only to become more painful. Finally extracted. Rheumatic pains flared up very severely for about three days, until tooth socket began to heal, then pains began to subside. Patient put on potassium iodide, and in three weeks practically all pain had disappeared from joints and has not since returned. Last time case was treated one year and three months ago.

CASE 4. Mr. D., age forty, married, leucic suspect; however, Wassermann was negative. Pains in lower limbs, also had had two strokes of paralysis. Examination of mouth revealed it highly infected with pyorrhea. Teeth were cleaned and patient put on mouthwash for three days, after which four hopeless teeth were extracted. Pyorrhea was then



treated and patient put on potassium iodid. Pains entirely disappeared about ten days later and patient felt better than he ever had.

CASE 5. Miss L. C., age eighteen, single, pains in ankles, patient in bed for four weeks. Examination of mouth showed an impacted lower second bicuspid. The tooth was somewhat loose, due to infection about the root.

Portion of the alveolar structure had to be removed in order to get the teeth out. Root showed considerable absorption. Pains in limbs began to disappear five days after removal of tooth.

310 MURPHY BLDG.

## Bacteriology of the Periapical Tissues of Pulpless and Viable Teeth.

By CARL D. LUCAS, D.D.S., Indianapolis, Ind.

(Read before the annual meeting of the Pennsylvania State Dental Society, Reading, April 27 to 29, 1920.)

**R**ADIOGRAPHIC evidence plus bacteriological findings from the periapical tissues at the apices of tooth sockets are a sane and scientifically logical means for the deduction of the true status of patho-histologic conditions existing at the ends of pulpless and viable tooth roots.

Clinical evidence, gained by the compilation of complete history findings of cases in which patients manifest systemic sequelæ, due to the absorption of toxins from possible foci of chronic infection, is of vast importance.

Therefore, our first responsibility to our clientele may be considered, in a measure, advantageously met after we have recorded complete history records of clinical findings.

These records should include blood-pressure readings, both systolic and diastolic with the deducted pulse pressure, blood count, with differential count and hemoglobin percentage, urinalysis, heart and chest sounds by auscultation and percussion, and the most complete bacteriological determination possible by means of stained smears from lesions,

culture growths and a definite differential determination of the colonized organisms.

From the above hypothesis we realize that the dental diagnostician must necessarily devote a great amount of his valuable time to individual preparation for the duties which become incumbent upon one who may be classed as an eligible in that specialty.

### EXAMINATION OF PATIENTS.

Routine examination of patients seeking oral surgical advice should include:

*First.* Clinical examination of all teeth in the mouth, record of all shell, Logan, Richmond, slipper and jacket crowns, Carmichael attachments, extensive gold, amalgam, porcelain or synthetic restorations and a record of all missing teeth.

*Second.* Condition of gingival and pericemental tissues.

*Third.* Record of neoplastic formations or tumefactions of the gums, bone, mucous or submucous tissues.



*Fourth.* Faradic test record of all teeth practically applicable.

*Fifth.* Radiographic interpretation of conditions visibly evident at the apices, bifurcations and trifurcations of pulpless teeth, with especial reference to osseous rarefactions, lateral, bifurcational, or trifurcational root perforations, pericemental pathological evidence, interseptal osseous resorption, cryptic pathology in sockets from which abscessed teeth have previously been extracted, fractured tooth roots and incompletely filled pulp canals. Notation of osteosclerotic areas, hypercementosis, cystic formations, unerupted, impacted or supernumerary teeth and anomalous conditions.

*Sixth.* If the patient should submit a history of sinusitis, transillumination of the maxillary and frontal sinuses should be made and radiographic films and plates exposed and interpreted for record of shadow notation.

*Seventh.* Tabulations should be made of specific lesions of the mucous membrane of the mouth and throat, such as mucous patches, leukoplakia, tuberculous ulcers, sinuses, rodent ulcers of the lips or face, Vincent's angina, *et cetera*.

*Eighth.* Gross anomalies of the mouth, such as cleft palate, hare-lip, Hutchinsonian teeth, supernumerary teeth, visibly impacted teeth, and irregularities of the arches should be recorded.

#### CLINICAL HISTORIES.

Our clinical histories should include notations of the condition of the tonsils, presence of adenoid tissue and gross pathology of the pharynx.

Tonsils should be examined by retraction of the anterior pillars of the fauces with pressure exerted upon the glands for the purpose of expressing pus or caseous deposits from their crypts, and notation made of visible hypertrophy or submersion of the tonsils. If the tonsils are found to be diseased the patient should be advised to consult his laryngologist for final advice in this regard.

The pulse, temperature and respira-

tion should be charted, heart murmurs and regurgitations noted, history of palpitation and dyspnea on exercise, loss of weight, neurasthenia, marked by malaise, lack of energy, insomnia, loss of appetite and pain in the back, regional cephalalgia and clinical or submitted history of opsialgia should be charted. The condition of the eyes with reference to purulent conjunctivitis, the condition of the ears with reference to furuncular, or suppurative otitis, the condition of the stomach and bowels and every clinical evidence which might be in any measure attributed to subacute infection should be noted and charted.

Such history records may be compiled upon printed forms, requiring from thirty minutes to two hours of time, depending upon the case in question. It is not necessary in all cases for us to make such detailed records, especially those in which we make blood counts and record other laboratory tests, but when a patient presents for examination exhibiting a general debilitated condition, and his radiographs present extensive and generalized mouth sepsis or show many pulpless teeth with incomplete canal fillings, we feel justified in making a complete examination.

A series of such records will be of value and will prove interesting in comparison, aside from their worth in aiding us in our diagnoses, advising patients who may need medical or general surgical as well as dental surgical attention, and the assistance they afford in the determination of the course of procedure, the anesthetic of choice and the mode of operation.

It is our custom to have our operated cases report in person or by letter at frequent intervals for the purpose of checking up the possible benefits derived physically by the elimination, surgically, of oral focal infection. In this manner we may determine a logic for future surgical procedure in similar cases.

For the past four months we have invariably made cultural inoculations, incubated, stained and examined microscopically the growths of organisms from

the apices of each tooth we extract, both vital and pulpless teeth.

#### TECHNIQUE OF MAKING CULTURES.

Our routine technique is practically as follows:

Every operation is made according to aseptic surgical techniques.

Immediately upon the extraction of each tooth, without permitting its apex to come into contact with any instrument, the gum or the gauze or drapings, we pick up a direct culture from its apex with a sterile platinum loop, which suspends a loopful of freshly distilled and subsequently boiled water as a vehicle.

This direct culture is planted in culture media, in some cases, blood agar slants, blood agar plates, glucose ascitic agar or Loeffler's, or bouillon culture. Loeffler's medium is probably the best when we are in doubt about the kind of infection present. Staphylococci will grow upon simple media. Streptococci grow upon blood agar slants or plates. Pneumococci grow upon Loeffler's or blood agar. If a blood agar plate be inoculated and streaked, thereby diluting the direct culture, the individual organisms will colonize to a degree and we are thereby aided in our studies for differentiation, and the approximate number of colonies with well-defined zones of hemolysis may be compared by percentage with all other colonies.

A record of the tooth from which the culture is taken, date of inoculation and kind of media is recorded and the culture placed in the incubator. If the tooth be supporting a crown or bridge, or is devitalized and crowned with Logan or Richmond crown, is filled with a post support for the filling, or has been treated by a known routine therapeutic technique we record this data.

We incubate for from eighteen to twenty-four hours at 37° C. and examine the media for growth. If no growth be present we place in incubator and run for twenty-four hours before re-examination for growth. Examinations of cul-

tures for growth are made daily for five days. If no growth is evident after five days of incubation the culture is considered negative and is discarded.

From the positive cultures we carefully pick up the individual colonies, mount, fix, stain by Gram method, examine microscopically and record our findings.

In many cases we have inoculated blood agar plates with smears from the apices of pulpless teeth in one field and smears from the apices of teeth with viable pulps in other fields of the same plates. The inoculated fields from pulpless teeth have invariably shown plus growths, and those fields inoculated from the apices of pulp-viable teeth without pulpal exposure by caries and free from extensive periodontoclasia involvement, from the same patient's mouth, have proved negative.

This procedure eliminates the possibility of error which might arise, due to the lack of uniformity, physically and chemically in the culture media. If the media, thus inoculated be prepared and contained in Petri plates, it must necessarily have uniform properties for the growth of pathogens.

Therefore, a plus growth from a pulpless tooth and a negative growth from a pulp-viable tooth upon different fields of the same plate cannot be attributed to a difference in the properties of the media or time of incubation.

Cultures from the ends of previously resected tooth roots in by far the greater percentage of cases were positive. Therefore, further and convincing proof must be forthcoming before we will hazard a favorable prognosis upon the efficiency of root resection as a successful procedure for the elimination of oral focal infection.

This report has not been prepared for the purpose of the condemnation of all pulpless teeth.

We instigated these investigations for the purpose of presenting facts, regardless of individual prejudice in the matter. "Facts, not individually expressed opinions," must become our slogan if we

## ABBREVIATIONS.

Lo. Cr.—Logan crown.  
 S. Cr.—Shell crown.  
 R. Cr.—Richmond crown.  
 Slip. Cr.—Slipper crown.  
 In.—Inlay.  
 Fill.—Filling; amalgam or gold.  
 Fractional notations represent apical portions unfilled.

Py.—Pyorrhea or periodontoclasia.  
 ) X.—Large granulum.  
 ( X.—Small granulum.  
 O.K.—Canals completely filled.  
 V.—Vital pulp.

## BROWN.

No.	Case No.	Tooth.	Condition.	Canals.	Culture.	Organisms.	Granulum-X.
1	1	U. L. Cent.	Lo. Cr.	O.K.	Plus.	Strep.	No X.
2	2	U. R. Cent.	Lo. Cr.	1/10	Plus.	Staph.	No X.
3	3	U. R. Lat.	Lo. Cr.	1/10	Contam.	B. sub.	No X.
4	4	U. L. Lat.	Lo. Cr.	1/2	Plus.	Strep. & Vin.	No X. Perf.
5	5	U. L. 2d Bi.	Lo. Cr.	1/2	Contam.	B. sub.	No X.
6	6	U. L. 1st M.	S. Cr.	1/2	Neg.	—	No X.

## HUSTON, H.

7	1	U. L. 1st Bi.	Lo. Cr.	1/2	Plus.	Strep.	( X.
8	2	U. L. Lat.	Fill.	3/4	Plus.	Strep.	) X.
9	3	U. R. 1st Bi.	Lo. Cr.	4/4	Plus.	M. catarrhalis.	) X.
10	4	U. L. 1st M.	S. Cr.	4/4	Plus.	Staph.	No X.

## FURSCOTT.

11	1	L. L. 1st M.	S. Cr.	1/2	Plus.	Strep.	No X.
12	2	L. R. 1st M.	Fill.	1/2	Plus.	Staph.	) X X.

## SMITH, E.

13	1	U. L. Lat.	Fill.	4/4	Plus.	Pneumo.	( X.
14	2	L. L. 2d Bi.	Root.	O.K.	Plus.	Staph.	No X.

## ZUMPERT, Mrs.

15	1	L. L. 3d M.	S. Cr.	1/4	Plus.	Staph.	( X X.
16	2	U. R. Lat.	Fill.	Vital.	Neg.	—	—
17	3	L. L. 2d Bi.	S. Cr.	1/10	Neg.	—	—
18	4	L. R. 2d M.	S. Cr.	1/10	Neg.	—	—
19	5	L. R. 3d M.	Socket.	—	Plus.	Staph. Prev. Ex. Not Cured.	—
20	6	U. R. 1st M.	Fill.	1/6	Plus.	M. catarrhalis—Perf. into Max. S. Pneumo.	—

## VOISA, Mrs.

21	1	U. R. 1st M.	Fill.	4/4	Plus.	M. catarrhalis—Perf. into Max. S.	—
22	2	U. R. Lat.	Lo. Cr.	1/2	Plus.	Staph.	( X.

## MOORE, E.

23	1	U. L. Cent.	Lo. Cr.	1/4	Plus.	Staph.	) X.
24	2	U. R. Lat.	Lo. Cr.	O.K.	Plus.	Staph. Root prev. resected.	—



HUNTER.		L. R. 1st M.	Fill.	1/2	Plus.	Staph.	
25	1		Fill.				) X X.
SHIR-, Mrs.							
26	1	U. L. 2d Bi.	R. Cr.	1/10	Neg.	—	—
27	2	L. L. 2d M.	Socket.	—	Plus.	Staph.	—
28	3	L. L. 3d M.	S. Cr.	O.K.	Neg.	—	—
HOWAR-, J.							
29	1	L. L. Cus.	Fill.	O.K.	Plus.	Pneumo.	—
30	2	U. L. 1st Bi.	Lo. Cr.	O.K.	Neg.	—	—
31	3	L. L. 1st M.	Fill.	1/4	Plus.	Staph.	No X.
STEMPF-, Miss.							
32	1	U. R. 1st Bi.	Fill.	Vital.	Neg.	—	—
33	2	U. L. 1st M.	S. Cr.	1/2	Pos.	Staph.	) X.
DOUGHER-,							
34	1	L. R. 2d Bi.	Socket.	—	Pos.	Staph. Prev. ex.—not curetted.	—
MUELLE-,							
35	1	U. R. 1st Bi.	Fill.	1/4	?	Gram—B.	( X.
36	2	Pus L. eye.	—	—	Pos.	Staph.	—
CHAPM—,							
37	1	U. L. Cent.	Resected.	O.K.	Pos.	Pneumo.	No X. Resected 1915.
38	2	U. R. 2d M.	S. Cr.—Br.	1/3	Neg.	—	No X.
39	3	U. R. 1st Bi.	Car. Cr.	Vital. ?	Pos.	Strep. pneumo.	No X.
NEW.							
40	1	U. R. Lat.	Fill.	4/4	Pos.	Diphther. Staph.	) Py. ) X.
41	2	U. R. Lat.	Fill.	4/4	Pos.	Pneumo.	) Py. ) X.
DODD—,							
42	1	U. R. 1st Bi.	Lo. Cr.	4/4	Pos.	Pneumo. Paste in canals.	) X.
SHAW.							
43	1	U. L. Cent.	Fract.	O.K.	Pos.	Pneumo.	) X into nose. Resect.
BOHN.							
44	1	L. R. 2d M.	Fill.	1/2	Pos.	Strep.	No X. ) Py. X.
CRITTENBURG—,							
45	1	U. R. 3d M.	Fill.	4/4	Neg.	—	No X.

CHAPMAN--			Condition.	Canals.	Culture.	Organisms.	Granulum-X.
No.	Case No.	Tooth.					
46	1	U. L. 2d Bi.	Resected.	O.K.	Pos.	Staph.	No X.
47	2	U. L. 2d Bi.	Resected.	O.K.	Pos.	Staph.	No X. Blood agar plate
MILLER.							
48	1	U. L. 2d Bi.	S. Cr.	4/4	Pos.	Strep. py.	) X.
49	2	L. R. 1st M.	Fill.	4/4	Pos.	Strep. py.	No X.
50	3	L. R. 1st Bi.	Fill.	4/4	Pos.	Strep. py.	) X.
LUCAS, C. D.							
51	1	L. R. 1st M.	Fill.	1/10	Pos.	Pneumo.	No X.
GREAT--							
52	1	L. R. 1st M.	S. Cr.	4/4	Pos.	Pneumo. Staph. A.	) X X.
NICKERS--							
53	1	U. R. Cent.	Root.	4/4	?	B. subtilis (Contam.).	No X.
54	2	U. R. Lat.	Root.	4/4	Pos.	Staph. Gram-neg. bac.	) X.
55	3	U. R. Cus.	Root.	4/4	Pos.	Staph. a.	) X.
56	4	U. L. Cent.	Root.	4/4	Pos.	Staph. a. Pneumo.	) X.
57	5	U. L. Lat.	Root.	4/4	?	B. subtilis (Contam.)	) X.
58	6	U. L. 1st Bi.	Root.	4/4	Pos.	Staph. a. Vincent's.	) X.
59	7	U. L. 2d Bi.	Root.	4/4	Pos.	Staph. a.	) X.
WILSON, --							
60	1	U. L. 1st Bi.	Fill.	Vital. ?	Neg.	--	No X.
GOULD.							
61	1	U. R. 1st M.	Fill.	4/4	Neg.	? Properties media.	) X X X.
KIMM.							
62	1	L. R. 1st M.	S. Cr.-Br.	3/4	Neg.	? Properties media.	(X.
63	2	L. R. 1st Bi.	S. Cr.-Br.	Vital. ?	Neg.	? Media.	No X.
64	3	L. L. 1st M.	Fill.	M 4/4 D 1/4	Neg.	? Media.	No X.
These last five cases cannot be considered. Strep. py. inoculated on same batch media from pure culture would not grow.							
CURRI--							
65	1	U. R. Cent.	Fill.	1/4	Pos.	Staph. a.	No X.
CHAPMAN--							
66	1	U. L. Cent.	Lo. Cr.	O.K.	Pos.	Strep. V. Pneumo. Catarrh.	--
Root resected 1915. No rarefaction evident.							

Owe--.

67	1	U. L. Cent.	Lo. Cr.	1/10	Pos.	Strepto. bacillus, Pneumo.	(X.)
68	2	U. L. Lat.	Lo. Cr.	1/2	Pos.	Strep. py. Pneumo. Staph.	) X.
69	3	U. L. 1st M.	Fill.	4/4	Pos.	Strep. py. Strep. B. Staph.	X X X.
70	4	U. L. 2d M.	S. Cr.	1/2	Pos.	Short. Strep. py. Pneumo. Staph.	X.
71	5	U. L. Cus.	Fill.	1/10	Pos.	Staph.	) X.
72	6	U. R. Lat.	Lo. Cr.	O.K.	Pos.	Staph.	(X.)
73	7	U. R. Cent.	Lo. Cr.	4/4	Contam.	B. subtilis.	) X.

BRETZM--.

74	1	U. R. Cent.	Lo. Cr.	O.K.	Neg.	—	No X.
75	2	U. R. Lat.	Lo. Cr.	1/10	Neg.	—	No X.
76	3	U. R. Cus.	Lo. Cr.	1/4	Neg.	—	No X.
77	4	U. R. 1st Bi.	R. Cr.	1/2	Pos.	? Perf. Dist.	(X.)
78	5	U. R. 2d M.	Rt.	4/4	Pos.	Strep. py. Pneumo. Buried root.	No X.
79	6	U. R. 1st M.	S. Cr.	1/2	Pos.	Staph. a.	No X.
80	7	U. R. 3d M.	S. Cr.	1/2	Pos.	Strep. V. Staph. a.	No X.
81	8	U. L. Cent.	Lo. Cr.	1/10	Pos.	Gram-neg. bac.	) X.
82	9	U. L. Lat.	Lo. Cr.	1/2	Pos.	M. catarrhalis.	(X.)
83	10	U. L. Cus.	Lo. Cr.	O.K.	Pos.	Strep. py. Staph. a.	No X.
84	11	U. L. 1st Bi.	Lo. Cr.	1/2	Pos.	Gram-neg. bac. M. catarrhalis.	(X.)
85	12	U. L. 2d Bi.	R. Cr.	1/2	Pos.	Strep. V. Staph. a.	) X.
86	13	U. L. 1st M.	S. Cr.	4/4	Pos.	Strep. py. Pneumo.	No X.
87	14	U. L. 2d M.	Fill.	4/4	Pos.	Strep. py. Staph. a.	No X.
88	15	U. L. 3d M.	Fill.	Vital.	Pos.	Staph. a. (Deep pyor. pocket mes.)	—

The last fifteen case reports were cultured upon blood-agar plates

CURRI--.

89	1	U. R. Cent.	Fill.	O.K.	Pos.	Staph. a.	) X.
90	2	U. R. Lat.	Vital.	Vital.	Neg.	—	No X.
91	3	U. R. Cus.	Fill.	4/4	Pos.	Strep. py. Staph. a.	No X.
92	4	U. R. 1st Bi.	Socket.	—	Neg.	—	—
93	5	U. R. 2d Bi.	Socket.	—	Neg.	—	—
94	6	U. R. 1st M.	Socket.	—	Pos.	Pneumo.	—
95	7	U. L. Cus.	Lo. Cr.	1/10	Pos.	Staph. a.	No X.
96	8	U. L. 1st Bi.	Socket.	—	Neg.	—	—
97	9	U. L. 2d Bi.	Socket.	—	Pos.	Strep. py.	—
98	10	U. L. 1st M.	Fill.	Vital.	Neg.	—	No X.

The last ten cases were cultured upon blood-agar plates.

Boz--.

99	1	L. R. 1st M.	Fill.	4/4	Pos.	Strep. (Paste in canals.)	No X.
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JOHNSON, G.	No.	Case No.	Tooth.	Condition.	Canals.	Culture.	Organisms.		Granulum-X.
							Strep.	Staph. (Deep pyor. pocket)	
YOUNG.	100	1	U. L. 2d Bi.	—	Vital.	Pos.			—
	101	1	U. L. 2d M.	S. Cr.	1/2	Pos.	Strep.	(Acute abscess.)	No X.
	102	2	L. R. Cus.	Inlay.	1/2	Pos.	Strep.	Staph.	No X.
BERRYH---	103	1	U. R. 2d Bi.	Socket.	—	Neg.	—		—
	104	2	U. L. Cus.	Socket.	—	Pos.	Strep.		—
LIESE.	105	1	U. R. Cus.	R. Cr.	4/4	Neg.	—		) X.
	106	2	U. L. 1st Bi.	R. Cr.	4/4	Pos.	Strep.	Staph.	) X.
	107	3	U. R. 2d Bi.	R. Cr.	4/4	Pos.	Strep.	Staph.	) X.
	108	4	U. R. Lat.	Socket.	—	Pos.	Diphtheroid.		—
MAYER.	109	1	L. R. 1st M.	S. Cr.	1/2	Neg.			No X.
McDERM--.	110	1	L. R. 1st M.	Fill.	1/2	Pos.	Staph. a.		No X.
	111	2	U. R. 1st M.	Pyor.	Vital.	Pos.	Strep. py.	(Deep pyor. pocket.)	—
	112	3	U. R. 2d M.	Pyor.	Vital.	Pos.	Staph. a.	(Deep pyor. pocket.)	—
DRYER.	113	1	L. R. 2d Bi.	Pyor.	Vital.	Pos.	Staph. a.	(Deep pyor. pocket.)	—
	114	2	L. R. 1st Bi.	Pyor.	Vitality. ?	Pos.	Strep.	Staph. Dip.	(X.
BARNES.	115	1	U. L. 1st M.	Fill.	1/2	Pos.	Strep. Vincent's.		(X.
	116	2	L. R. 1st M.	Fill.	4/4	Pos.	Staph. a.		) X.
WILLIAMS, E. A.	117	1	U. R. 1st Bi.	S. Cr.	4/4	Pos.	Staph. a.		) X.
	118	2	U. L. 2d Bi.	S. Cr.	1/6	Neg.	—	(Pyor. dist.)	(X.
	119	3	U. L. 1st M.	Fill.	Vital.	Neg.	—		No X.
PARRY.	120	1	U. L. Cus.	Root.	O.K.	Pos.	Strep.		(X.
	121	2	U. L. 1st M.	R. Cr.	1/2	Pos.	Diphth. Staph. (M-B root resect.)		—

DOWD--	1	U. R. 1st Bi.	Lo. Cr.	1/4	Pos.	Pneumo.	(X.
122							
NICHOL--	1	U. L. Lat.	Fill.	O.K.	Pos.	Gram-neg. bac. Pneumo. Diphth.	No X.
123							
124	2	L. R. 2d M.	S. Cr.	1/10	Pos.	Strep. Staph. Pneumo.	(X.
125	3	L. R. 2d Bi.	R. Cr.	1/10	Pos.	Pneumo. Diphth.	No X.
STEMP--							
126	1	L. R. 2d Bi.	Inlay.	4/4	Pos.	Strep. V. (Canal filled paste.)	(X.
127	2	L. R. 1st M.	Fill.	4/4	Pos.	Diphth. Gram-neg. bac.	—
FRAWL--							
128	1	L. R. 3d M.	Fill.	4/4	Pos.	Staph.	(X.
STEMP--							
129	3	L. L. 2d M.	Fill.	4/4	Pos.	Strep. Pneumo.	—
MAFF--							
130	1	L. L. 1st M.	Fill.	O.K.	Pos.	Staph. a.	No X.
MORGENDO--							
131	1	U. R. Cent.	Lo. Cr.	1/4	Pos.	Gram-neg. bac.	No X.
132	2	L. L. 1st M.	S. Cr.	3/4	Pos.	Diphth.	(X X.
133	3	L. L. 2d Bi.	Fill.	1/6	Neg.	—	No X.
134	4	U. L. Cent.	Lo. Cr.	1/4	Pos.	Strep. V.	(X.
135	5	U. R. 1st M.	Fill.	4/4	Pos.	Staph. (Pyor. dist.)	(X.
AVERY.							
136	1	U. L. Lat.	Fill.	1/2	Pos.	Diphth. Vincent's.	(X.
137	2	U. L. 1st Bi.	Fill.	1/2	Pos.	Staph. a.	(X.
HOWARD.							
138	1	L. R. Cus.	Resected.	O.K.	Pos.	Strep. V. Gram-neg. bac. (Resected 1915.) F. Tiss.	—
HOUSTON, Mrs.							
139	1	L. R. 1st Bi.	Fill.	4/4	Pos.	Staph. a.	No X.
140	2	L. R. 2d Bi.	S. Cr.	4/4	Contam.	B. subtilis.	No X.
LAYDE--							
141	1	U. R. 1st M.	Fill.	1/2	Pos.	Staph. a.	No X.
HART.							
142	1	L. R. 3d M.	Fill.	1/2	Pos.	Staph.	No X.

KIBLER, W. D.	No. Case No.	Tooth.	Condition.	Canals.	Culture.	Organisms.	Granulum-X.
	143	1 L. R. 1st M.	Socket.	—	Pos.	Strep. V. (Extd. 6 yrs. ago.)	—
	144	2 L. L. 1st M.	Treat.	Tri-Cre-For. Treat.	Pos.	Strep. Staph.	No X.
BOHN, Mr.							
	145	1 L. R. 2d M.	Fill.	1/2	Pos.	Staph. (Pyor.)	No X.
MONSIEUR.							
	146	1 L. R. 1st M.	Fill.	4/4	Pos.	Strep. Diphth. (Pyor.)	No X.
MAXWELL.							
	147	1 Trench mouth.	—	—	—	Vincent's, Staph.	—
HOWARD.							
	148	1 L. R. Lat.	R. Cr.	O.K.	Pos.	Staph. a.	No X.
	149	2 L. L. Lat.	R. Cr.	O.K.	Neg.	— Press. anes.—immed. canal fill.	No X.
WHEELER.							
	150	1 L. R. 2d M.	Pyor., loose.	4/4	Pos.	Gram-neg. bac. Strep. B. Vincent's.	No X.
HOLLWE.							
	151	1 L. R. 2d M.	Fill.	1/10	Pos.	Strep. V. Pneumo. Staph.	(X.)
	152	2 U. R. 2d Bi.	Jacket Cr.	1/4	Contam.	B. subtilis.	(X.)
	153	3 U. L. 1st M.	Fill.	4/4	Pos.	Staph. a. Strep. V.	No X.
	154	4 L. R. 1st M.	S. Cr.	1/10	Pos.	Strep. V. Pneumo.	Very large X.
TEAGARD.							
	155	1 L. R. 2d Bi.	Fill.	4/4	Pos.	Strep. Staph.	(X.)
	156	2 U. L. 1st Bi.	Inlay.	1/3	Pos.	Staph. a.	(X.)
	157	3 L. L. 3d M.	Fill.	4/4	Pos.	Pneumo.	No X.
	158	4 L. R. 3d M.	Fill.	4/4-1/10	Pos.	Strep. Staph.	No X.
NIHMA.							
	159	1 Trench mouth.	—	—	—	Vincent's, Strep.	—
HART.							
	160	1 U. R. Cent.	Slip. Cr.	4/4	—	B. subtilis. (Contam.)	No X.
	161	2 U. L. Lat.	Lo. Cr.	O.K.	Pos.	Strep. (Canal fill, through apex.)	—
	162	3 U. L. 2d M.	S. Cr.	4/4	—	B. subtilis. (Contam.)	(X.)
	163	4 L. L. 2d Bi.	Fill.	4/4	Pos.	Staph. (Plus to faradic.)	No X.



BOZE.		U. L. Lat.	Lo. Cr.	1/10	Contam.	B. subtilis.	No X.
164	1	U. L. Lat.	Lo. Cr.	1/10			
SIN CLAI—							
165	1	U. R. 2d Bi.	Lo. Cr.	4/4	Neg.	—	( X.
166	2	U. R. 1st M.	Fill.	1/2	Pos.	Staph. a.	) X.
167	3	L. L. 1st M.	Fill.	1/2	Pos.	Gram-neg. bac.	) X.
BEVERID—							
168	1	U. L. Cent.	Root.	4/4	Neg.	—	No X.
169	2	U. R. Cent.	Vital.	—	Pos.	Pneumo.	No X.
170	3	U. R. Lat.	Root.	4/4	Pos.	Pneumo.	( X.
171	4	L. L. 1st Bi.	Root.	4/4	Neg.	—	No X.
172	5	L. R. 1st Bi.	Vital.	—	Neg.	—	No X.
173	6	U. L. Cus.	Root.	4/4	Pos.	Staph.	( X.
174	7	U. R. 2d M.	S. Cr.	4/4	Pos.	Vincent's. (Deep py. pocket.)	No X.
FITTO—							
175	1	L. R. 1st M.	Fill.	4/4	Pos.	Staph. a.	Very large X.
GARLAN—							
176	1	U. R. Cent.	Vital.	—	Neg.	—	No X.
177	2	U. L. 2d Bi.	Fill.	4/4	Pos.	Strep. V. (Pyor.)	) X.
178	3	U. L. Lat.	Lo. Cr.	1/3	Pos.	Staph. (Broach in canal.)	No X.
179	4	U. L. 1st M.	S. Cr.	4/4	Pos.	Gram-neg. bac.	No X.
MAXWE—							
180	1	U. L. 1st M.	Fill.	1/2	Pos.	Pneumo.	No X.
181	2	U. R. 1st M.	Fill.	4/4	Pos.	Staph. a.	) X.

are to become properly classed as scientific, professional, sagacious gentlemen who are engaged in the practice of a specialty of the healing art, called Dentistry.

In presenting the results of our bacteriological investigations we will present the case number, tooth, condition, condition of canal, condition of periapical tissues with reference to rarefaction, positive or negative culture, and micro-organisms found.

#### RESULTS OF BACTERIOLOGICAL INVESTIGATION.

The results obtained are shown in the tables on pp. 1200 to 1207 inclusive.

We are undecided as to whether the Gram-negative bacillus is the bacillus prodigiosus or otherwise. In pure culture it ferments dextrose and does not ferment lactose or maltose. We are of the opinion that it is a non-pathogen.

Organisms identified are as follows:

	Times found.
<i>Streptococcus viridans</i> .....	11
<i>Streptococcus pyogenes</i> .....	37
<i>Staphylococcus albus</i> .....	78
Diphtheroid bacilli .....	10
Gram-negative bacilli .....	11
Vincent's organisms .....	8
<i>Streptococcus hemolyticus</i> ....	? 4%
<i>Pneumococcus</i> .....	30
<i>Micrococcus catarrhalis</i> .....	6
<i>Streptobacillus</i> .....	5
<i>Bacillus subtilis</i> (Contam.) ...	9
Negative cultures .....	26
Cultures inoculated .....	181
Cultures from granulomata ....	71

Considering the patients' clinical pictures before the surgical removal of pulpless teeth and their subsequent physical improvement after the removal of such teeth, plus bacteriological findings in the individual cases, we are convinced that, generally speaking, pulpless teeth should be considered in at least ninety per cent. of cases a menace to human health and happiness.

HUME—MANSUR BLDG.

[See also *Discussion*, as reported under "Proceedings of Societies," this issue.]

## Rachitis and Enamel Hypoplasia.

By Dr. B. GOTTLIEB, Vienna, Austria.

THE authors of existing publications on the histology and histogenesis of enamel hypoplasia can be divided into two groups.

The first group (Berten, Black, Walkhoff, Zsigmondy) investigated the enamel hypoplasia of human teeth. These researches were carried on entirely with grindings, so that the actual process of formation could only be construed with more or less probability. Opinion as to any pathological change of the enamel epithelium and its surrounding parts was entirely a matter of conjecture.

The second group (Erdheim and Toyofuku) investigated the change in the teeth of a rodent, like the rat, which takes place after removal of the epithelium corpuscles.

A comparison of the results of these researches shows a remarkable divergence of opinion, so that it is impossible to form a uniform idea as to the origin and nature of the enamel hypoplasia.

Berten describes an incomplete calcification of the rods in the lines of Retzius as follows:

Defects in the enamel are attributable to the same process, but the layers thus affected are situated wholly or partly on the surface. The acinose or globular substance of their feebly calcified parts contracts more closely, the epithelium substance above sinks in and produces in this way a concave part. The rods above the line of Retzius connected with the defect show very frequently a deviation from their normal course. The break consists of a fine-grained substance. Rods are not perceptible. The adjacent rods form at this point a sharp dividing line. Owing to the complete decomposition of the rods into a fine-grained substance all connection is interrupted. This line must be looked upon as a fissure between the two border layers of normal and abnormal calcification.

In his Tables published in 1894 and in his work on this subject published a year later, Walkhoff is entirely of the same opinion, *i.e.*, that the enamel hypoplasia is due to the absence of calcification; he describes, however, the process of formation differently.

In his last-mentioned publication he says:

The transition to these defects (enamel hypoplasias) is represented by those cases in which the outward shape of the tooth was still maintained macroscopically, but where the enamel cells produced principally nothing but organic substance. In case of prolonged interruptions in the development of enamel rods thus affected in connection with deficiency of lime, Nature evidently tries to help herself in this way, that enamel rods thus affected for a certain time do not develop to their usual length, but remain smaller within a certain region. In this way it becomes possible that even these rods show a somewhat normal appearance. In each case organic substance is deposited. This fact proves that even in the case of most serious defects enamel cells are not only actually there, but that they even show a certain activity, by which, however, owing to the deficiency of lime, very little elementary substance is produced. In every case the reason of it is the diminution of the lime deposit.

The Tables say: "The temporary cessation of the calcification produces the lines of Retzius, when it stops entirely; enamel defects are produced also in the peripheric parts of the rods."

In his "Biological Studies on Dental Caries" published recently, in which he accepts Koch's theory about the infectious character of rachitis in its full extent, Walkhoff gives up his original opinion and attaches very great importance to the primary injury of the



ameloblasts by microorganisms. He describes a premature atrophy of the ameloblasts and a formation of vacuoles on the tooth germ of a newborn syphilitic child, where no enamel hypoplasia was noticeable.

He continues as follows:

The primary fact in the really pathological process is the injury done to the cells by microorganisms during the growth of the tooth and not the deficiency of earth salts. I think it probable that infection and internal secretion are concerned in the formation of defective structures of the teeth.

Black says:

Atrophy, in all cases, consists of an arrest, or partial arrest, of growth of both enamel and dentin in the particular zone or part of enamel and dentin being developed at the particular time. In the milder cases growth is imperfect, leaving certain definite markings outlining the particular parts of the tissue then being formed. In all the severe cases the growth of both enamel and dentin is arrested.

Black then speaks about the pits in a separate chapter as pathological changes *sui generis* and adds: "I have been unable to form any idea of the pathology concerned in the formation of these pits."

Zsigmondy assumes a decay of the enamel cells, which corresponds to the pits. He is the first to describe the "break line of injury."

When the perniciousness which causes the enamel defect occurs, the enamel cells which have formed the older and, beyond a certain length, calcified rods, perish. In this way the rods cannot develop any further and show the corresponding effect.

Those parts of the enamel which have not developed to such an extent and are situated more toward the root, suffer an interruption in the calcification from which they bear an everlasting mark. They grow, however, further when the detrimental influence stops.

Erdheim and Toyofuku describe the change in the enamel of rat teeth, as follows:

(Erdheim.) The enamel substance is subject to considerable interruptions. On parts which are free from enamel the enamel epi-

thelium clings directly to the dentin; there are also frequently in the epithelium itself small or large apparently amorphous drops which show the color of the enamel. The epithelium may also happen to be raised from the enamel and the space between may contain red blood corpuscles, detached epithelium cells, enamel substance in drops, and defective bits of enamel, consisting of rods. Very frequently the epithelium continues into the connective tissue of the alveolar periosteum where, quite away from the tooth itself, real enamel is formed. At the end the epithelium shows an *undulating* course. The inner enamel epithelium shows atrophy and may even disappear entirely, leaving isolated epithelium accumulations in the connective tissue.

Erdheim describes the dull, milky white streaks in the enamel as the first macroscopical appearance. The configuration of the surface is normal, but the enamel is soft and can be easily scraped off.

Toyofuku made almost the same observations, but described the various changes more in detail. "The raised epithelium is at first little affected in its structure and can continue producing enamel though it does not cling to the tooth, but the product does not have the appearance of enamel." He also speaks of "an injury to the epithelium causing a cessation of the production of enamel. The dividing line between enamel and dentin is always straight; only when the dentin, which acts as a foundation for the enamel, has an undulated appearance, then the enamel covering follows the folds. In this case the dividing line towards the dentin is also undulated."

I should like now to refer to the results of my researches into decalcified celloidin sections, and must explain first the meaning of the pictures.

Walkhoff says: "Newly formed, hypoplastic enamel of a syphilitic child stains with hematoxylin much more intensely; a sure sign that smaller quantities of lime salts are deposited." This is the only reference to this subject which came to my knowledge.

First of all we know that well-calcified enamel leaves after decalcification a slight shadow which in favorable cases is preserved *in situ*. In preparations

stained with hematoxylin-eosin a fibrous framework, interrupted by clusters and layers of enamel, remains as residue of the enamel rods. All these remainders of enamel stain with hematoxylin.

In the normal formation of enamel a protoplasmic elementary substance is produced by the ameloblasts, in which the protoplasm is replaced to a large extent by lime (the question in connection with this point is of minor importance to us). While in bone and dentin we know even at normal growth osteoid and dentinoid borders, in enamel there has never been the question of a similar formation, yet we have known for a long time that the protoplasmic body of the ameloblasts enlarges with the approach of the time for the formation of the enamel. If we should accept the opinion that the enamel rods come into existence by the calcification of the protoplasmic body of the ameloblasts, then we could call the additional protoplasmic cylinder which is added before the formation of the enamel, in analogy to the osteoid, "adaman-tinoid."

In case of normal development there is, however, no necessity to do so. In pathological cases it is different. Pathology begins at the moment when the deposits of lime do not appear. Until then everything goes according to the rule, *i.e.*, a protoplasmic elementary substance is formed from which the protoplasm disappears. The result is a delicate network which is not much different from the one which we described above as the residue after the decalcification of well-calcified enamel.

We see, therefore, that both extreme cases of totally calcified and non-calcified enamel are very similar to each other after decalcification in the celloidin sections.

The intermediate phase is different. It is to Ebner's everlasting credit that he proved by his investigations of enamel in polarized light that enamel, which to all appearance is completely formed, undergoes a change after the decay of the ameloblasts, somewhat in the way of a rearrangement of the molecules, by which it acquires its definite qualities,

particularly consistence. At this phase the enamel has not yet disappeared by decalcification, but is cohesive and stains with hematoxylin. While enamel consisting of framework, which at small magnification appears colorless, may be entirely calcified enamel or enamel which has never been calcified at all, enamel which is *stained intensely* with hematoxylin is certainly less calcified. The enamel parts which are *lightly tinged* may be of two-fold origin. They are either more advanced in their development than the intensely colored parts or they are less calcified.

The specimen which comes into consideration here is in a phase in which the enamel pulp is still in existence. The formation of the crown has not been completed in any part of the specimen. We need not, therefore, take fully developed enamel into consideration. Wherever we find discolored enamel, it is always a question of originally uncalcified enamel. There cannot be any doubt as to the interpretation of the colored parts in this important specimen.

We shall now describe the various specimens. The latest phase at my disposal can be seen in Fig. 1.\* It comes from a child three months old who died of enteritis. In this case no autopsy was made. The disk consists of a tiny little bit of dentinoid (*D-K*). There can be no question at all of a real series

#### \* EXPLANATION OF THE FIGURES.

##### Abbreviations:

*S*—Enamel.

*D*—Dentin.

*S-K*—Non-calcified enamel.

*D-K*—Non-calcified dentin (dentinoid).

*A Se*—Outer enamel epithelium.

*J Se*—Inner enamel epithelium.

*Sp*—Enamel pulp.

*p*—Tooth pulp.

*St i*—Stratum intermedium.

*Gf*—Vessels.

*G*—Gubernaculum dentis.

*Od*—Odontoblasts.

*Igr*—Interglobular space.

*U*—Break line.

*M E*—Mouth epithelium.

*E J*—Epithelium islands.

*H E S*—Hertwig's epithelium sheath.







shall see farther on, that defective calcification means always slow growth of the tooth in which the dentin acts quicker than the enamel, which accounts for the formation of folds in the enamel

Some time ago Erdheim pointed out to me, that the festooned appearance of the enamel dentin border line must be attributed to the fact that already the ameloblasts show a semi-globular border

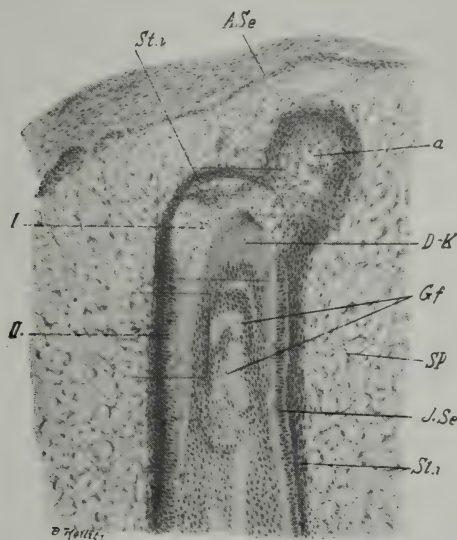


Fig 2

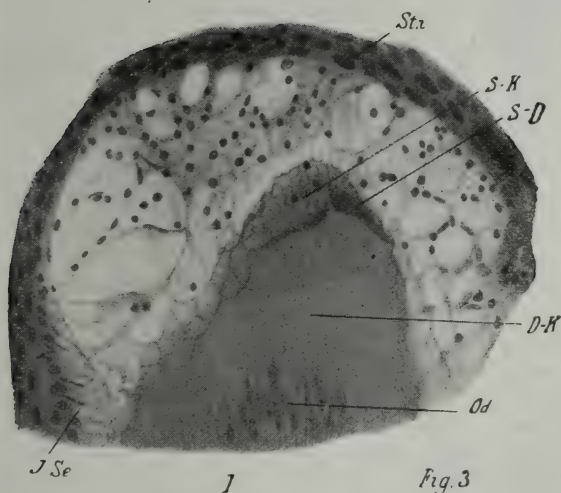
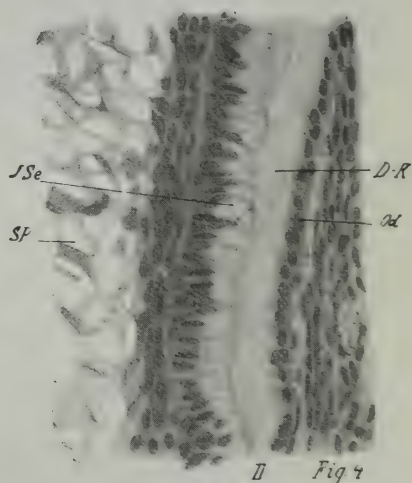


Fig. 3



II

Fig 4

epithelium. This picture can only be explained by the preceding remarks. We can hardly assume that enamel would have been formed from this enamel epithelium, if under ordinary circumstances this germ had continued developing.

toward the pulp cells; the festooned line exists from the beginning and the idea of a secondary erosion of the dentin must be given up. We notice in this and in the following pictures that the elementary enamel substance has the tendency

to form a border of semi-globular swellings toward the pulp cells.

A later phase will be seen in Figs. 2, 3 and 4 (two months' old syphilis congenita, rachitis).

The dentinoid disk is larger. The epithelial arrangement of the ameloblasts is maintained in places where they cling to the dentinoid. There are also traces of semiglobular protruding streaks of enamel toward the dentin (Fig. 3). The stratum intermedium shows at Fig. 2, *a* a globular protruding proliferation which will be discussed with the next specimen.

On the top of the dentin a small, well-colored streak is noticeable (Fig. 3, *S-D*) which belongs partly to the enamel and partly to the dentin; next to it is a group of less colored (transverse sections) rods (*S-K*). In the cavity between the inner enamel epithelium and the dentin disk which normally ought to be filled with enamel, we notice areolation with scattered cell nuclei. The dividing line between the ameloblasts and the stratum intermedium is clearly noticeable up to the cavity. The series of ameloblasts ceases on the border of the cavity so that it is bordered toward the enamel pulp only by stratum cells. This case may be explained in this way: At the beginning of the formation of the disk the conditions with regard to lime were for a short time normal. Soon afterwards the irregularity set in. A fairly large dentinoid disk and a corresponding cap of elementary enamel substance was formed. The first formed parts of the enamel (Fig. 3, *S-K*) are lightly colored; they show, therefore, a low grade of calcification. They have hardened sufficiently to be able to remain *in situ*. The remainder, the extent of which can be seen from the course of the stratum intermedium in Fig. 3, was not calcified at all. The enamel epithelium, degenerated in consequence of the non-appearance of calcification, crumbled to pieces and became dispersed into the non-calcified net of elementary enamel substance. From the fact that the enamel epithelium beyond the defect is still in good condition and the dentinoid

protuberance is normal, we may be justified in concluding that the pathological conditions did not last long before death.

If developed further an enamel hypoplasia would have resulted on the edge of the tooth, perhaps similar to the Hutchinson notch.

This specimen can also be explained in another manner. It is very extraordinary that the disintegration is so limited and that the ameloblasts are affected to such a great extent. We must admit the possibility of microorganisms (syphilis congenita) being the cause of the disintegration.

In Figs. 5, 6 (eight months old, *tbc. miliaris subacuta*, lymphadenitis *tbc. pneumonia*) the dentin disk is already fairly large; it consists of non-calcified dentin, except at the edge. The arrangement of the ameloblasts in the germ zone is normal, toward the edge similar to the case in Fig. 1. The enamel epithelium above the enamel cap is constructed irregularly and shows decided signs of degeneration (pyknosis). The regular arrangement of the rod streaks is noticeable both in longitudinal and transverse sections. They are partly stronger colored, particularly on the outer surface near *a*. On the slanting parts we find again the semi-globular streaks, protuberances which become smaller and smaller.

In Fig. 5 we notice at *a* a large cavity with scattered cells of the stratum intermedium, giant cells and amorphous detritus.

It would be difficult to explain the formation of this structure, if we had not in Fig. 2 and in Figs. 20 and 21 an early phase of it. The starting-point is the stratum intermedium. It grows in the shape of a bud which gets larger and larger toward the enamel pulp. After growing to a certain size the inner cells degenerate and crumble to pieces and a cyst-like cavity with the contents mentioned above appears.

This case is very similar to that in Fig. 20. Slight depositions of lime took place occasionally. The enamel hardened to a certain degree and is maintained *in situ*. Topographical conditions



in Fig. 6 are in many respects similar to those in Fig. 3, but in Fig. 3 evidently the hardening process did not develop so far and the elementary enamel substance is not maintained *in situ*. The condition of the enamel epithelium is in both cases equally bad, but in Fig. 6 it is *in situ*, while in Fig. 3 it is mixed up with the decayed elementary enamel substance. The large cavity in Fig. 5 represents, as mentioned above, a later

the whole picture must be looked upon as a primary defective deposition of lime with secondary affection of the epithelium. Walkhoff's view of a local infection can hardly be accepted, as in consequence of an injury to the epithelium by local affection we would have to expect degenerated enamel cells and a discontinued formation of elementary substance; in no case, however, can this be established beyond dispute. We see

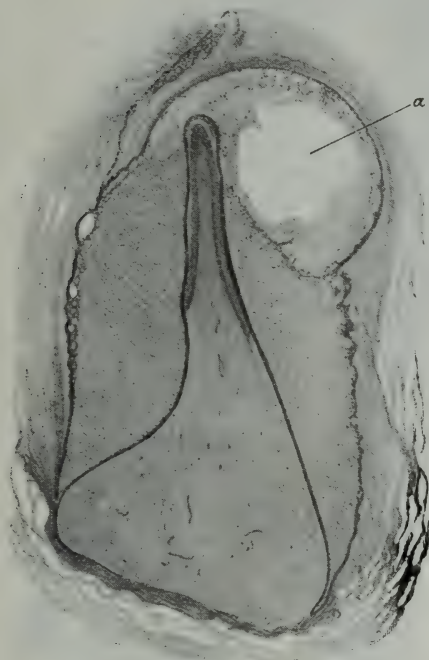


Fig. 5.

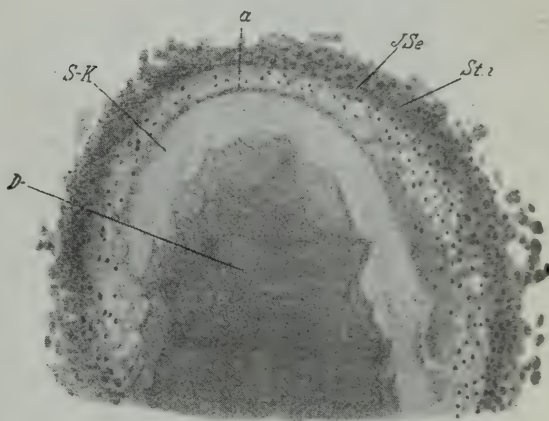


Fig. 6.

phase of development of *a* in Fig. 2. It is difficult to give an explanation for this proliferation in the stratum intermedium, which we shall meet once more in Figs. 20 and 21. In Fig. 2 we know that we are dealing with a case of syphilis congenita. In the present case *tbc.* preponderates; in Fig. 20 acute rachitis was observed. In Figs. 2 and 5 we must assume that this proliferation and the degeneration of the epithelium can be infectious.

In Fig. 20 on the other hand the enamel epithelium is hardly injured,

everywhere well-formed, but non-calcified, elementary substance. We must, therefore, maintain that the causes are primarily the non-appearance of calcification and then the degeneration of the epithelium and the proliferation of the stratum. The stratum intermedium is generally looked upon as a layer of supporting cells. When the stratum intermedium responds to a defective calcification of the enamel by proliferation, then we can consider this proliferation as a vicarious increase of the consistence. There is still another explanation for



this phenomenon. We can look for the nutritional source of the enamel epithelium only in the outer enamel epithelium (Williams).

The enamel pulp which is full of fluid, would then be the reservoir from which the stratum intermedium draws nourishment for the ameloblasts. If the formation of enamel is interrupted, the stratum cells cannot pass on the substance which they receive, they suffer, so to speak, from overfeeding and pro-

It has been raised arch-like at *a* (Fig. 7). On the opposite side it is only raised a little and forms a fold only at *b* (Fig. 7). Erdheim mentions in his publication that the raising of the inner enamel epithelium is vital only in cases where the cavity thus produced contains formed elements. We must confirm this opinion. In the cavity *a* of Figs. 8 and 9 we find enamel epithelium cells of va-

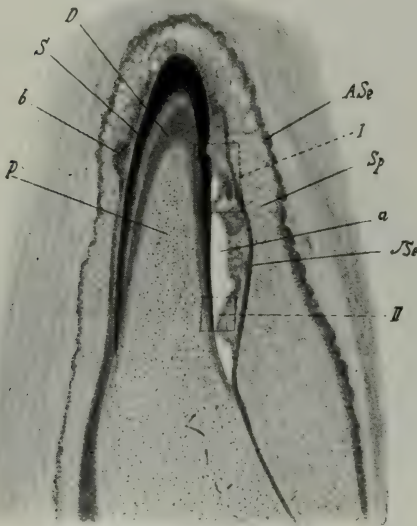


Fig. 7

liferate, which view I am disposed to consider as the most probable.

The next case is one and one-half years old. Diagnosis: Morbilli; Pneumonia; Cataracta congenita.

In Figs. 7, 8 and 9 the dentin disk shows in the older parts globular structure (at the edge). The dentinoid is broader. The ameloblasts show normal conditions only sporadically in the germ zone, otherwise conditions as in Fig. 1. Owing to the disk we can hardly speak any longer of enamel epithelium in these parts. The stratum intermedium is entirely uninterrupted. To it cling on the inner side the scarcely noticeable remnants of the inner enamel epithelium.

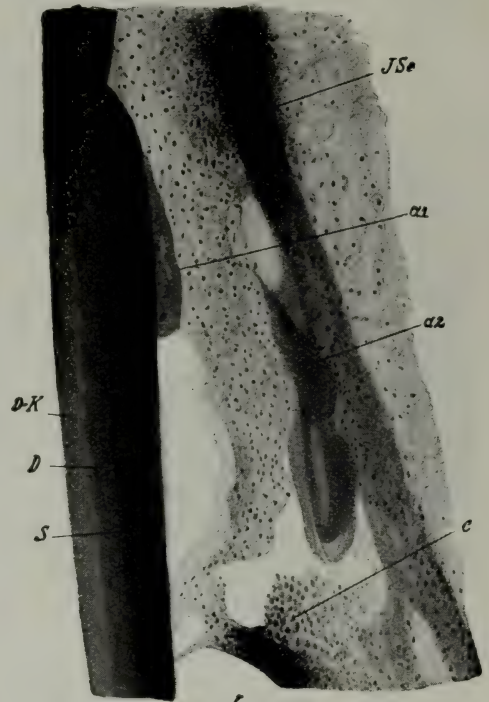


Fig. 8

rious phases of degeneration quite promiscuously, partly single, but mostly in tubule accumulations, and further connective tissue cells. We also notice everywhere masses of amorphous structures of round shape, *c* (Figs. 8 and 9), which are partly fragments of lime, and partly transverse sections of scattered rods. At *b* (Fig. 9) we find a honey-comb structure which can hardly represent anything else but twisted non-calcified rods. The surface of the enamel shows in one place a notch (Figs. 7 and 8), a hypoplasia. Below this place we

notice at *a* (Fig. 8) a deposition of enamel. Its configuration corresponds with a newly added layer like a parallel line of Retzius. This layer ceases suddenly at the bottom. In the adjoining cavity towards the border we find the above-mentioned amorphous structures. Separated from this layer of defective calcified enamel *a1* (Fig. 8) by an accumulation of cells, we see at *a2* (Fig. 8) a fragment of similar character and similar degree of calcification close to

fragment *a2* would correspond to the surface of *a1*.

We must already here emphasize that the displacement of the epithelium is something quite different from the proliferation of the stratum intermedium which we discussed in detail in Fig. 5. Even the structure *b* in Fig. 7 is not a proliferation of the stratum, but is a fold, as can be seen from the following section of this series. These folds are identical to those which Erdheim and

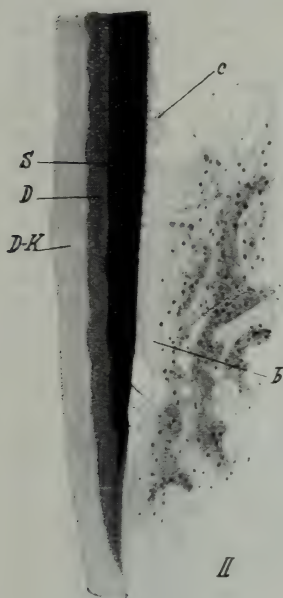


Fig. 9

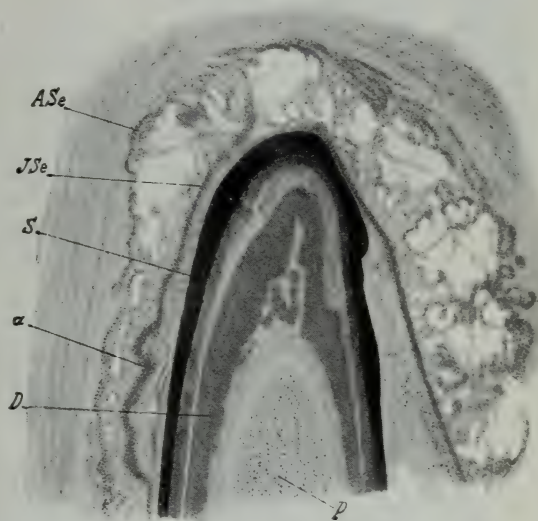


Fig. 10

the inner enamel epithelium, without being connected with the enamel. Outwardly it appears like the course of a line of Retzius interrupted by a notch (a hypoplasia). At the bottom this accumulation extends into a cavity, in which are the amorphous structures *c*. These observations may be explained as follows: At the time when the epithelium was displaced from the surface of the enamel, the ameloblasts were still able to form, and they actually did form enamel, *a2*, as if the epithelium had still been *in situ*. If we imagine the next older layer at *a1* fully developed, the

Toyofuku mentioned when describing the teeth of parathyroprivia rats. We shall discuss the importance of these folds later on.

In Fig. 10, the dentin contains from a certain period large interglobular spaces. The dentinoid is broadened. The inner enamel epithelium is raised on the one side arch-like, on the other side the arch is folded, *a*. The contents of the cavity formed in this way are the same as described in specimen Fig. 7. The thickness of the enamel covering is not uniform; the surface is uneven.

The displacement and the entire de-



generation of the epithelium dates from the latest period. If this tooth had come through it would have had only quite a

and such position could have produced any enamel.

In Figs. 11, 12 and 13 the same conditions prevail with regard to dentin and enamel epithelium as in the above-mentioned specimen. At Fig. 11 *I*, there is a well-developed hypoplasia, which terminates like a ring. When largely magnified (Fig. 12) we can observe that a series of degenerated enamel cells extends from the adjoining well-formed surface to the hypoplasia. The cells are almost cubical and the nuclei pyknotical. There is no reason to believe that the cells which correspond to the hypoplasia would have been different *in vivo*, than the ones which correspond to the formed enamel. As a comparison we give in Fig. 13 a lower portion where no trace of a hypoplasia can be found anywhere. The cells which are arranged in islands and tubes are degenerated to the same extent as those in Fig. 12. Below the enamel cells (Fig. 12 in the hypoplasia) we see a delicately areolated

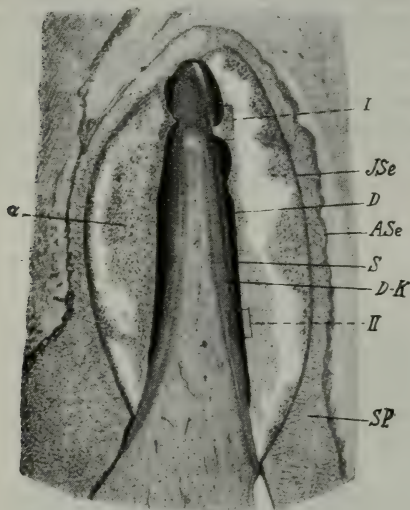


Fig. 11.

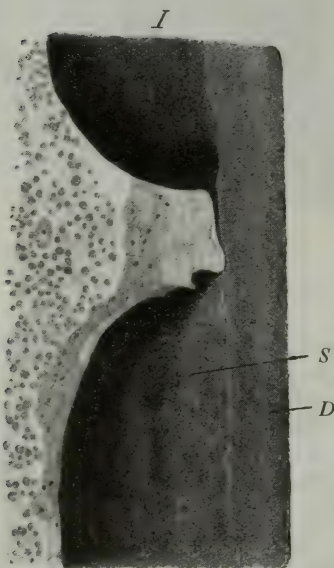


Fig. 12.

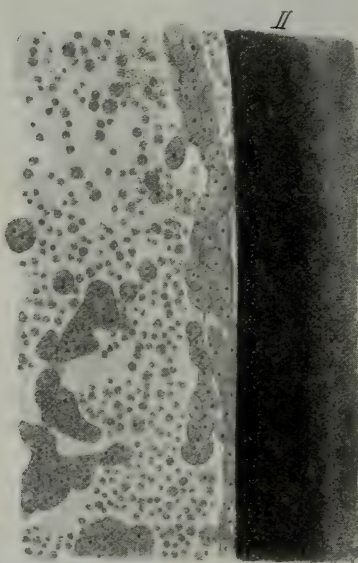


Fig. 13.

thin and defectively calcified covering of enamel. We can hardly imagine that an enamel epithelium of such appearance

structure of non-calcified enamel having fallen down. In this case too the sequence was: interrupted deposition of

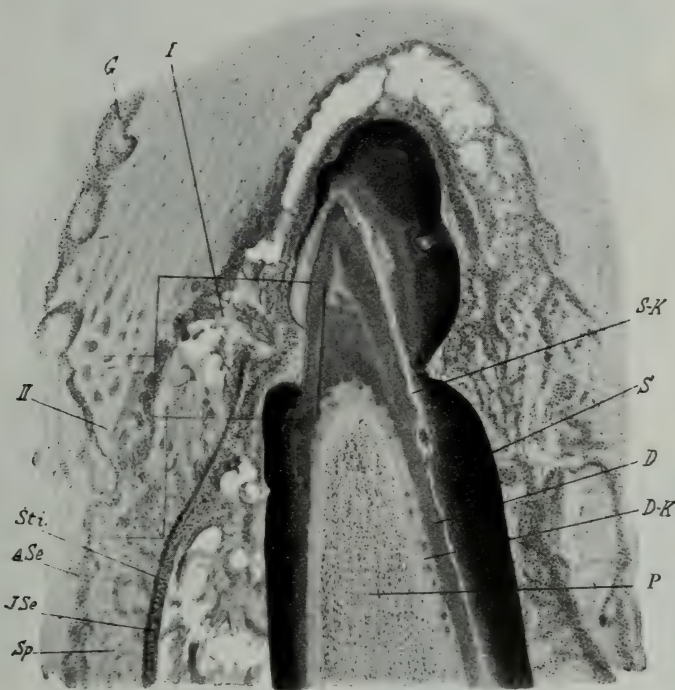


lime, retarded growth of dentin, displacement and degeneration of the enamel epithelium.

In specimen Figs. 14, 15 and 16 the dentin is very defectively calcified. The inner enamel epithelium is raised from the enamel surface in a broad arch. Owing to the enamel hypoplasia all connection is interrupted. As far as there is below the stratum intermedium an enamel epithelium it shows the change

to the excrescence of the gubernaculum dentis (*G*) and the outer enamel epithelium (*ASe*). In the corner between the two (at *a*) are fragments of heterotype, amorphous enamel. On the surface of the dentin is a layer of very defectively calcified enamel, which is interrupted at the hypoplasia (Fig. 14 *S-K* and Fig. 15 *a*). The hypoplasia came evidently into existence at the time when this layer of enamel was formed. Then follows an

Fig. 14.



described above. In the cavity thus formed we find, in addition to the already known formed elements, fragments of enamel, as described in Fig. 7. The place where the enamel epithelium breaks out owing to the hypoplasia, and the adjacent parts are especially interesting. Single enamel cells and irregular accumulations are widely dispersed not only in the enamel pulp, but also beyond it in the adjacent connective tissue. We see such accumulations in Fig. 16 next

apparently quite normally calcified layer, of which only a thin coat (at *b*) remains next to the broad hypoplasia (Fig. 15). On the other side and lower down this layer gets thicker. At the time of defective calcification when the hypoplasia was formed by crumbling, the adjacent parts at *a* were sufficiently hardened and conditions began to improve at *b*.

Owing to the crumbling near the hypoplasia the enamel cells next to it (*b*) suffered equally and the formation

Fig. 15.

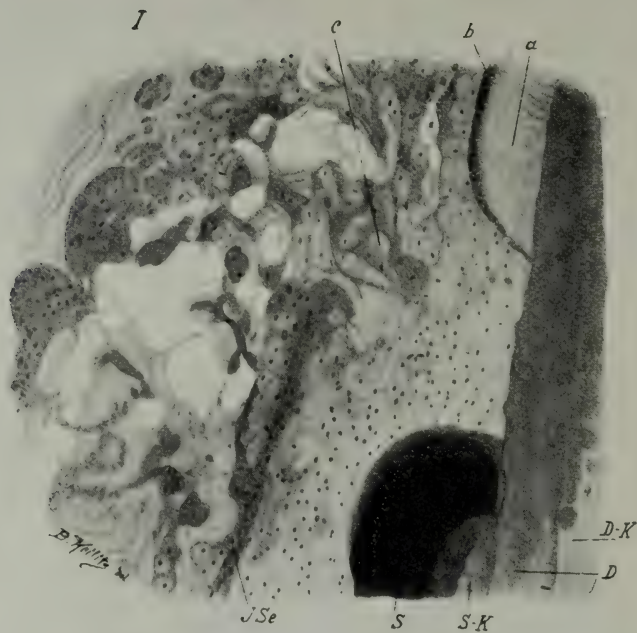
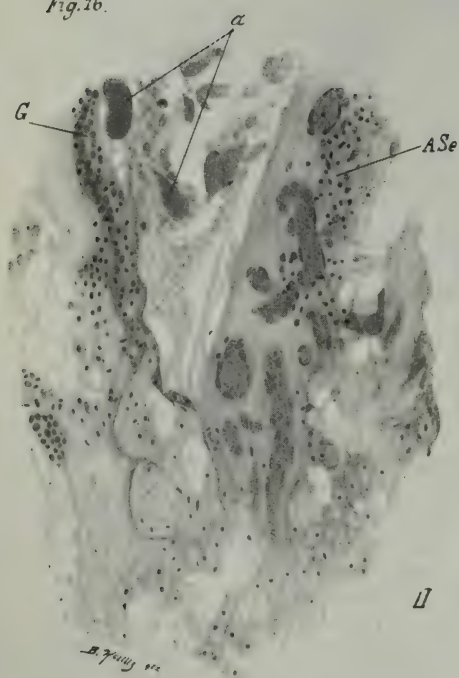


Fig. 16.



II

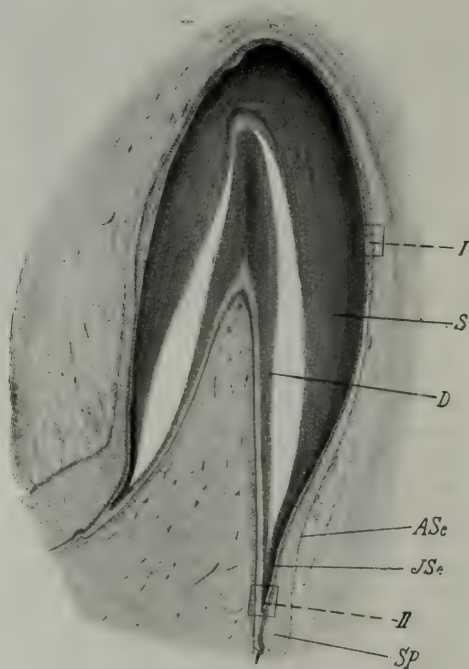


Fig. 17.

of enamel was interrupted there also. Altogether this side suffered more than the other. When we compare all pictures of this specimen (Figs. 7, 10, 11 and 14), which are derived from different teeth of the same individual, interglobular spaces, as we know them from the ground specimen, become everywhere apparent according to the phase of development of the hypoplasia.

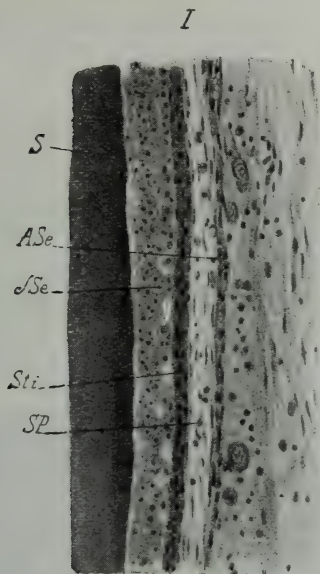


Fig 18

Figs. 17, 18 and 19 (sixteen months old, nephritis, hereditary syphilis) is a later phase with only slight changes. The break between the dentin and the enamel occurred during the process of preparing the specimen. We can see in the enamel below the edge a small notch. The dentin shows signs of defective calcification of medium degree. The enamel epithelium is raised on the left-

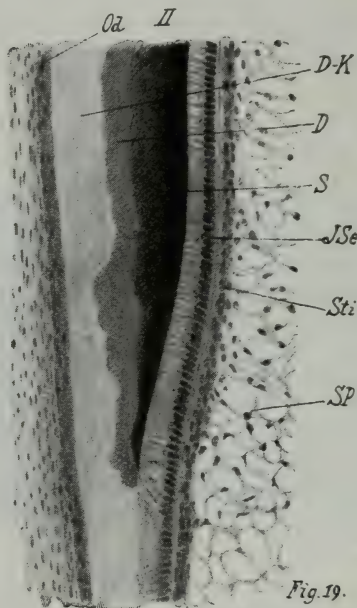


Fig. 19.

Some time after the enamel hypoplasia have been formed, enamel was still added to some extent in various teeth; with respect to the age this enamel is fairly well calcified. I believe that these intensely colored parts are calcified approximately to the degree of chalk enamel. The epithelium has been raised everywhere in folds and has become too large for the underlying surface.

hand side. In the interspaces are the usual contents. The ameloblasts in the parts toward the edge (Fig. 18) are irregularly arranged and have the shape of cubes with pyknotic nuclei; lower down (Fig. 19) they show normal shape and arrangement. In this case evidently a time of unfavorable conditions was followed by an improvement.

(To be continued.)



## Cast-Clasp Technique in Removable Bridge Work.

By NORMAN BEVERLY NESBETT, D.M.D., Boston, Mass.

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(Read before the Dental Society of the State of New York, at its annual meeting, held at Albany, N. Y., May 13, 14, and 15, 1920; also read before the Pennsylvania State Dental Society, Reading, Pa., April 27 to 29, 1920.)

**A**FTER a five-year trial, the cast clasp used as a means of replacing missing posterior teeth without mutilation of the abutment teeth involved, has become standard. Your essayist deems it important at this time to touch on the following points:

*First.*—For what purposes should the cast clasp be used?

*Second.*—What steps led to the establishment of the author's technique?

*Third.*—Why a working model on which to build the case is used from start to completion of the bridge.

*Fourth.*—Summary of five years' experience with the use of the cast-clasp bridge.

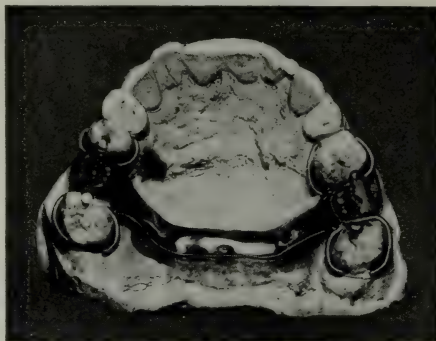
A review of our dental literature for the past eight years shows conclusively that the day of indiscriminate destruction of healthy pulps has past, never I believe to return. It shows the dental profession somewhat divided as to the actual menace of a devitalized tooth, but united on the question of pulp conservation. It also shows an awakened interest in correctly constructed partial dentures, with especial attention paid to the clasp as a means of fixture.

That we may have a clear conception of what we are to talk about, let us consider for a moment two removable constructions used to replace missing teeth. These are partial dentures and removable bridges.

There seems to be confusion in the minds of many of our profession as to what constitutes the difference between

a partial denture and a removable bridge. When the removable structure is so planned that the *saddle* receives the *burden* of the stress, and the abutments are utilized principally for the purpose of retaining the structure, then it should be classed as a *partial denture*. When

FIG. 1.



Showing partial denture in which no cast clasps are used. The denture is held in position by round-wire clasps. Cast lugs are used to prevent undue settling of the appliance.

the *abutments* take the *burden of the stress* regardless of whether or not a saddle is used, then the structure should be classed as a *removable bridge*, be it made of metal or vulcanite.

The cast clasp as referred to in this paper was devised for an attachment for *removable bridge work*, and has but a

limited use in *partial dentures*, where a clasp having *more resiliency* is usually indicated.

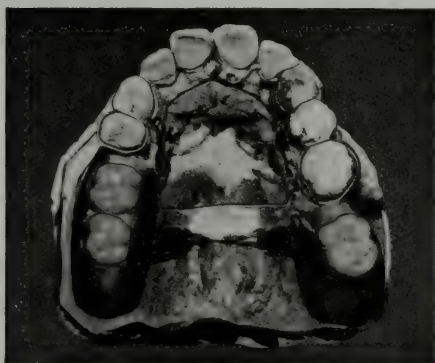
When used as an anchorage for removable bridge work the cast clasp has proved its worth and, used where indicated *where mutilation of the abutment teeth is not desirable*, cannot be excelled by any known attachment now before the dental profession.

Technique may be defined as the method in which an artist used his materials to express his mental conceptions. Hence the higher those mental concep-

profession early in 1915, extended over a two-year period in 1913 and 1914. During that two-year period of experimental work, many ideas and methods were tried and finally discarded. This with the purpose ever in mind of ultimately placing before the dental profession a completed technique, scientific, and yet at the same time practical and simple as possible. Of the discarded methods of producing a cast clasp I will mention the following:

*Experiment 1.*—Adapting casting wax and other wax directly to the abutment

FIG. 2.



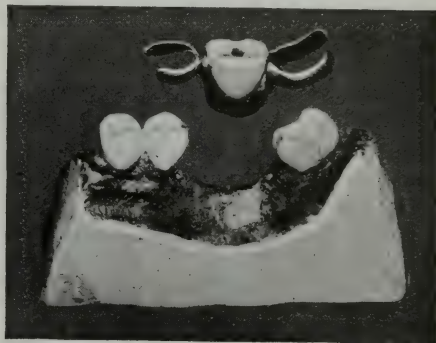
Illustrating a partial denture. The saddles taking the burden of the stress. Wrought clasps are used to hold the denture in position. An indirect retainer is also used across the anterior teeth.

tions, the more carefully planned will be the technique elaborated to fulfill those conceptions. A technique planned with the sole idea of producing something, must always fall before the technique of the one whose vision leads him to build a technique that turns vision into actual result.

Many examples to illustrate the foregoing might be given, but one will suffice. It has become an axiom that the perfection of product of the gold inlay worker is in direct ratio to the care he uses in following out the technique employed.

The experimental work done to produce the technique first presented to the

FIG. 3.



This is a removable bridge because the abutments take *all* the stress. The cast clasp here shown was designed by the author to serve as a removable bridge attachment. These appliances are frequently miscalled "partial plates."

teeth in the mouth and attempting to remove the pattern.

*Experiment 2.*—Adapting base plate and other kinds of wax to the teeth on a plaster model and casting, first, by cutting the teeth off the model, investing the whole mass, and casting; second, by removing the wax pattern.

*Experiment 3.*—Painting liquid casting wax on a model of the abutment tooth poured with inlay investment, investing the tooth and pattern, and casting. This same method was also tried with variations, such as: First, adapting thin casting wax to the tooth and building up the pattern to the desired

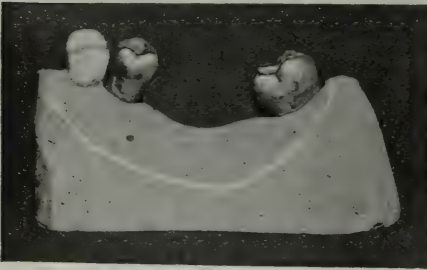


thickness with other casting wax; second, adapting a thin, pure gold matrix and then building up with casting wax; third, using a harder refractory material than inlay investment and casting direct to the tooth. Experiment No. 3 with its variations is the popular method followed by those who believe that the present technique is too difficult. If ease of execution had been the only *desideratum*, our experiments would have ended with Experiment No. 3.

Quite satisfactory cast clasps can be produced by the use of all the foregoing methods.

Experiments were then conducted on models prepared with removable teeth,

FIG. 4.

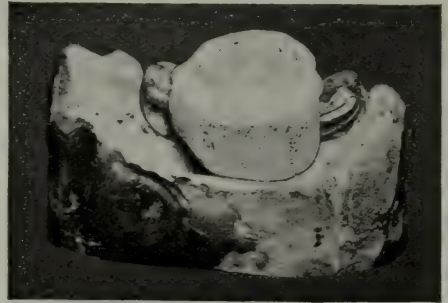


Working model showing removable amalgam teeth.

Weinstein's artificial stone being first used. This, although far harder than plaster of Paris and indispensable in practically all prosthetic operations, proved too soft, and amalgam was then substituted. These amalgam teeth proved satisfactory and are used at present. Experiments were also tried with the use of horizontal notches cut into the enamel of the buccal and lingual surfaces of the clasped teeth; and with the use of short, round-headed pins or spuds set into the buccal surfaces of the abutment teeth. These pins engaged corresponding depressions in the buccal arms of the clasps, much in the manner of a glove fastener. As the idea of these devices is to gain additional retention to compensate for a poorly fitting clasp, and as the cast clasp *should* be used with

the idea of *avoiding* tooth mutilation, the writer considers their use contraindicated. Indeed, he considers their use in an average case a confession of

FIG. 5.



Taking relations of cast clasps in their *correct positions* on the abutment teeth.

inability to make a proper fitting cast clasp.

Early experiments showed that it was very difficult in all cases, and almost impossible in some cases, to test the proper

FIG. 6.



Testing completed metal structure of a cast-clasp bridge to insure proper fit. Note the relative amount of enamel surface covered by the cast clasps. Most cast clasps are too bulky.

fit of a cast clasp by trying it on the abutment tooth in the patient's mouth. Therefore some other means of obtaining the correct relations of the clasps to the teeth, other than the customary method of first taking an impression with the



clasps fitted to the patients' teeth, had to be devised.

Our technique was developed with the idea of having an unblemished model on which to build the case, take relations of

"The practice of every art," says Professor Huxley, "implies a certain knowledge of natural causes and effects; and the improvement of the art depends upon our learning more and more of the prop-

FIG. 7.

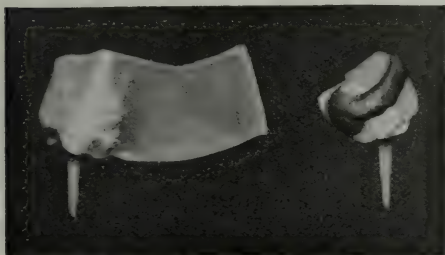
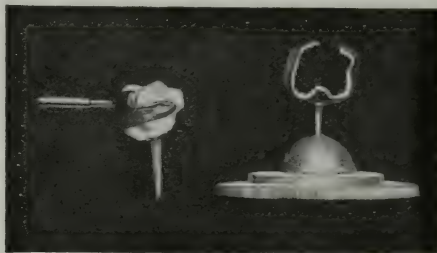


FIG. 8.



Showing from left to right the four successive steps in forming the wax pattern under tension on a metal tooth model.

clasps in their *correct* positions, and make final fittings and adjustments; but best of all, it enables us to properly design our clasps, and know that we can get the bridge easily in and out of posi-

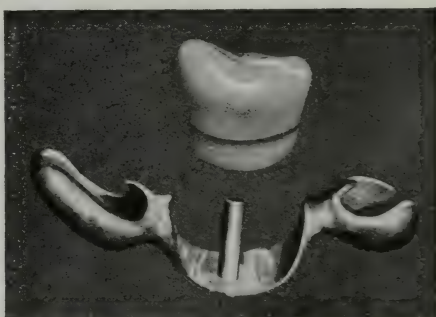
erties and powers of natural objects, and discovering how to turn the properties and powers of things and the connections of cause and effect among them to our own advantage." The most practical

FIG. 9.



The cast clasps are here seen in position on the metal tooth model. The *end grip* of the clasps should be noted.

FIG. 10.



Completed cast-clasp bridge with porcelain tooth ready to be cemented to position. Note strength of clasp arms and form of occlusal rest used.

tion when completed. The technician who destroys his model at any phase of the process is obliged to wait for a trial in the patient's mouth, with the result that much tedious blind grinding often has to be done before the piece can be adjusted.

thing in the world is the most scientific. In fact, nothing becomes really practical until it is put on a scientific basis; that is, until its relation to other facts is known and noted. To be scientific as well as practical a cast clasp should not

be a mere inert, bulky ring of metal, but should be resilient to a slight degree; not much heavier than a wrought clasp of 24 gage (B. & S. Standard), but most important of all, should grasp the tooth tighter at its ends than anywhere else. This last-named property is obtained by forming under tension a casting-wax pattern on a metal tooth. Owing to the shrinkage of the casting wax used (Taggart's) this tension is released when the pattern is chilled and removed from the metal tooth model, causing the two ends of the pattern to draw together slightly. This, with a further contraction of the casting metal, cast in a cool mold, causes the finished clasp to grasp tighter at its ends than at any other point in its circumference.

This grip is highly desirable because of the following facts: Masticating force applied to a clasp type removable bridge tends to move it principally in three directions: gingivally, mesially, and distally. Three inclined planes are brought into play in each clasp, one at the occlusal rest and two at the ends of the clasp arms. The tendency of the bridge to act as a wedge is slightly increased by the inclined planes of the occlusal rests, and these forces must be correctly counterbalanced by a strong resistant grip at the *ends* of the clasp arms or the bridge will fail in time, due to the opening and loosening of the clasps or the shifting mesially and distally of the abutment teeth. Comparatively slight gripping power is required to retain the bridge against all ordinary efforts of mastication, but great strength is required in the clasp arms to keep the abutment teeth from migrating and consequent loosening, and to limit the lateral motion of the piece. Theoretically, the use of the round-wire clasp gives the greatest insurance against future disintegration of the abutment teeth, but unfortunately the round-wire clasp has not the forenamed properties of the cast clasp. If the round-wire clasp had succeeded in cases where the cast clasp has succeeded, the cast clasp would have no excuse for existence. The writer is frankly willing to admit that he has, for twenty years, always

used the round-wire clasp wherever he could (see Fig. 1), but that he can not now substitute it for the cast clasp where the cast clasp is indicated. He also has had occasion to note, since the cast clasp became popular, its use in many cases of prosthesis where the use of wrought clasps of either wire or sheet clasp metal would have been much better.

The successful prosthodontist must invariably be the one with many methods at his command. No one type of appliance or attachment will fit every case. Depending upon his wise selection and proper application of the many forms of attachments now in use, as well as upon his technical ability, will his work succeed or fail.

#### CONCLUSIONS.

Five years' experience with the cast clasp as devised by your essayist has brought out the following points:

That it is a most useful attachment for posterior removable bridges where mutilation of tooth structure is to be avoided.

That it will succeed in bridge cases where other types of clasps have failed.

That it is adaptable to all variations of form of bicuspid and molars, and over ninety per cent. of cuspids.

That it is practically immune to breakage providing a suitable gold alloy is used for casting.

That the abutment teeth and adjacent tissues remain in good condition.

That patients *will* remove and clean the appliance if *properly instructed* and due emphasis is placed on the *importance* of such cleaning.

That the finished clasp is no better than the wax pattern.

That the correct designing of the wax pattern has largely to do with the success of the finished bridge.

That the cast clasp is useful only in a *very limited number* of cases of *partial plates*.

That a method, although simple, may not be as easy as it seems.

To those of the profession who were using cast clasps prior to 1913, I have this to offer. It is promptness of execution that puts the value into any idea.



The best idea in the world is valueless until put into working shape and used. The technique of the cast clasp was put into working shape in 1914, and has been in use ever since. Your essayist believes, with the late Theodore Roosevelt, that every man owes some of his time to the upbuilding of the profession or business

to which he belongs. The host of friends of the cast-clasp bridge already in the dental profession is proof positive that the writer's experimental time was not spent in vain.

125 MARLBOROUGH ST.

[See also *Discussion*, as reported under "Proceedings of Societies," this issue.]

## The Advantages of the Use of Local Anesthesia for the Performance of Oral Surgical Operations upon Patients with Pulmonary Tuberculosis.

By HERMAN BRODY, D.M.D., New Haven, Conn.

CHIEF OF THE DENTAL SERVICE AT THE WILLIAM WIRT WINCHESTER HOSPITAL, NEW HAVEN, CONN.:  
FORMERLY DENTAL SURGEON AT THE POLYCLINIC HOSPITAL, NEW YORK CITY;  
LATE DENTAL SURGEON, U. S. ARMY.

THE administration of general anesthetics for the performance of oral surgical operations upon patients with pulmonary tuberculosis and other pleuro-pulmonary affections, such as bronchitis, bronchial stenosis, pneumonia, pulmonary emphysema, pulmonary sclerosis, atelectasis and lung tumors, is contra-indicated. Ether, for example, is a powerful irritant to the respiratory tract and its use for such patients should be condemned. Chloroform, on the other hand, is less irritating to the respiratory tract but it has such lethal properties that the oral surgeon should abstain from its administration. "At the Surgeon's Congress of 1910, Neuber estimated that one fatality still occurred in 2953 cases of chloroform anesthesia."<sup>1</sup> Cryer<sup>2</sup> states, "There is no use in a dental surgery for chloroform except to dissolve gutta-percha." Nitrous oxid, although the safest of all general anesthetics, is a tissue poison, and the asphyxiating condition caused by its administration should receive serious consideration. A patient with pulmonary tuberculosis requires pure fresh air

and plenty of it—the non-oxygenation of blood which takes place when he is subjected to a general anesthetic may cause serious consequences and even death. The fact that the administration of nitrous oxid is accompanied by some dangers is substantiated by the following excerpt:

"A. H. Miller<sup>3</sup> has collected references to eighteen deaths. Teter knows of twenty-six fatalities. Rovsing was able to get trace of thirteen deaths, several of which have been suppressed. Gwathmey knows of twenty to forty unreported deaths."

### INDICATIONS FOR LOCAL ANESTHESIA.

The oral cavity is probably the oldest and most practical field for the application of local anesthesia. Nerve-blocking anesthesia can be induced by the zygomatic, infra-orbital, mandibular and palatal injections.

Fully ninety-five per cent. of oral surgical operations can be performed with such injections. Kufer<sup>4</sup>, a medico-legal authority, states: "After extensive

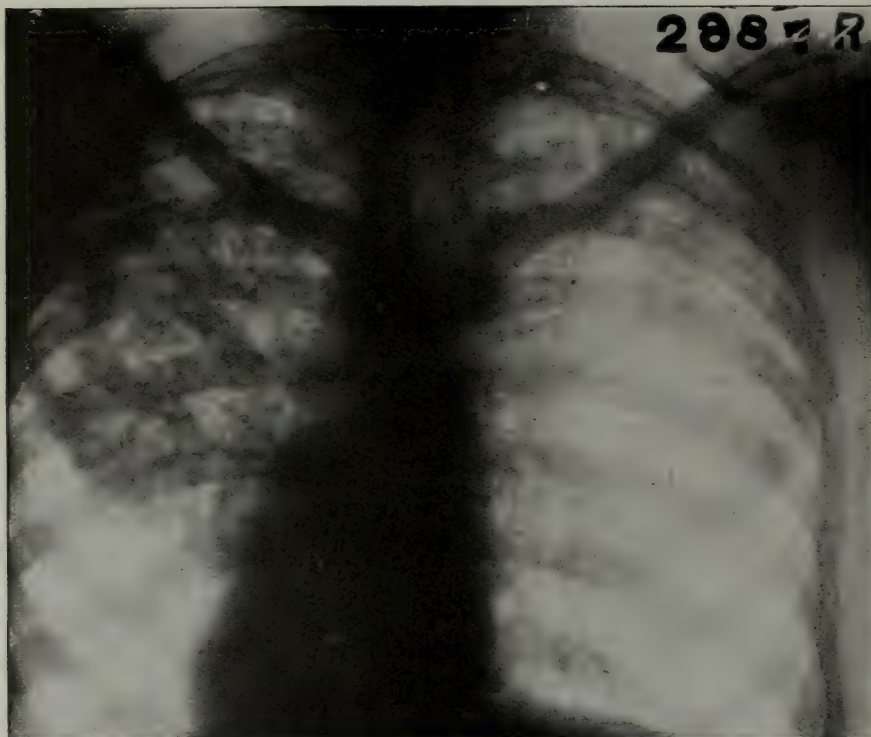


observations I do not hesitate to maintain that general anesthesia, with the few exceptions enumerated, is unnecessary in operations in the oral cavity, and that, as a medico-legal expert, I should be unable to protect an operator from

eral anesthesia, such as pneumonia, renal disorders, vomiting, and nausea, are prevented.

3. The presence of the anesthetist with his cumbersome appliances is removed from the field of operation.

FIG. 1.



Radiograph of a patient with pulmonary tuberculosis. The pulmonary field has a mottled appearance. The radiolucent circumscribed area extending in the supra and subclavicular region (left side) is a pulmonary cavity. This patient requires pure fresh air and plenty of it—the non-oxygenation of his blood which would take place were he subjected to a general anesthetic would cause serious consequences or even death.

indictment in case of a fatal accident from general anesthesia.”

#### ADVANTAGES OF THE USE OF LOCAL ANESTHESIA.

The principal advantages of the use of local anesthesia for operations in the oral cavity are:

1. The dangers from the administration of general anesthetics are obviated.
2. The after effects, subsequent to gen-

4. A local hemostasis can be produced by the addition of suprarenin to the novocain solution. This gives the oral surgeon an almost bloodless field for the operation.

5. The patient can coöperate with the surgeon, can change the position of the head, or can adhere to any suggestions which will facilitate the work.

6. The patient can expectorate and will not swallow mucus or blood.

7. Under local anesthesia, the parts anesthetized will remain so for an hour and the operator can work with deliberation and avoid unnecessary haste.

8. Another extremely valuable advantage is that no lengthy preparation is required on the part of the patient or operator.

9. The patient can be discharged after the performance of the operation. This is an important advantage of using local anesthesia in an ambulatory dental practice.

10. By using the infiltration method we paralyze the nerve endings so that no impressions caused by the traumatism are transmitted to the brain; or prevent the impulses from traveling beyond the point of the injection as in the conduction method. When a patient is under the influence of a general anesthetic the sensory nerve paths are not blocked and a needless exhaustion of nerve force takes place. Surgical shock is the result.

#### ANOCI-ASSOCIATION.

The supreme importance of preventing fear, pain, etc., before and during surgical anesthesia was brought to the attention of the medical profession by Dr. George W. Crile of Cleveland. His theories were promulgated after the most careful and thorough research work. Crile states:<sup>4</sup>

"The difference between anesthesia and anoci-association is that, although inhalation anesthesia confers the beneficent loss of consciousness and freedom from pain, it does not prevent the nerve impulses from reaching and influencing the brain, and hence does not prevent surgical shock nor the train of nervous impairments so well described by Mumford. Anoci-association is accomplished by a combination of special management (applied psychology), morphin, inhalation anesthesia, and local anesthesia.

"In operations under inhalation anesthesia the nerve impulses from the trauma reach every part of the brain, the cerebrum that is apparently anesthetized as well as the medulla that is known to be awake, the proof being the

physiological exhaustion of and the pathological changes in the nerve cells."

Judging from the above conclusions, it can be readily seen, that there is a decided advantage in the use of local anesthesia. By blocking the paths which connect the field of operation, we can prevent nervous exhaustion no matter how severe the operation.

#### MANAGEMENT OF TUBERCULAR PATIENTS.

At the hospital with which I am connected, we are treating patients who

FIG. 2.



This shows the essayist and assistant operating on a tubercular patient. Rubber gloves and face masks are worn as protective measures while operating on such patients.

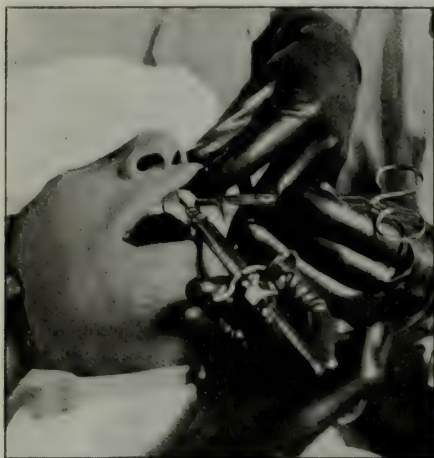
have a wasting disease—tuberculosis. Many of them are timid and nervous and prefer general anesthesia because they do not desire to watch the instrumentation and have a knowledge of what is going on. We explain to such patients that general anesthesia is contra-indicated and not in a single instance has one refused to have an operation performed under local anesthesia.

The terror of the dental chair is greatly reduced by the administration of a mild narcotic before the operation.

Bromural, veronal and codein sulfate are efficacious for pre-operative medication. We also place a wet napkin over the eyes of the patient while operating, in order to diminish the fear and ex-

tient does not feel the introduction of the needle. We are always striving to eliminate fear and pain and our efforts are well appreciated by these tubercular patients.

FIG. 3.



A piece of absorbent cotton is saturated with ethyl chlorid and held over the point of injection for half a minute. The injection is then made and the patient does not feel the introduction of the needle. A wet napkin is placed over the eyes of nervous patients in order to diminish fear and excitement induced by the sight of instruments.

citement induced by the sight of instruments.

At the clinic we eliminate the pain caused by the initial puncture of the hypodermic needle while injecting. A piece of absorbent cotton is saturated with ethyl chlorid and held over the point of the injection for half a minute. The injection is then made and the pa-

#### NOVOCAIN, THE LOCAL ANESTHETIC OF CHOICE.

Novocain is the least toxic of all local anesthetics. After making several injections in tubercular patients, we have never as yet seen any toxic secondary effects. Many of these patients were of very low vitality and some were suffering from tuberculosis, associated with syphilis. In no instance, have we seen any tissue lesions and we can state with confidence that novocain is positively non-irritating; even the pale mucous membranes of tuberculars tolerate it and show no necrotic symptoms after injections.

#### CONCLUSIONS.

1. General anesthetics are contra-indicated for the performance of oral surgical operations upon patients with pleuro-pulmonary affections.
2. The excitation is just as great during the induction of a general anesthetic as the entire period in which a local anesthetic is used.
3. Anoci-association is best secured by pre-operative medication, local anesthesia and special management of patients.

#### REFERENCES.

- <sup>1</sup> FISCHER AND RIETHMÜLLER: "Local Anesthesia in Dentistry."
- <sup>2</sup> KIRK: "American Text Book of Operative Dentistry."
- <sup>3</sup> BALDWIN: "Practical Medicine Series."
- <sup>4</sup> BROWN: "Oral Diseases and Malformations."



## CORRESPONDENCE

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### "Case of Absorption of Tooth Root."

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TO THE EDITOR OF THE DENTAL COSMOS:

Sir,—I am enclosing two radiographs of a case, illustrating pathological ab-

Film No. 2 was taken immediately after extraction.

FIG. 1.



FIG. 2.



sorption of distal root of molar, with simultaneous regeneration of subjacent osseous tissue.

Very truly yours,  
HARRY J. FIELD, D.D.S.

130 MARKET ST., NEWARK, N. J.

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### "To Prevent Fainting Under Novocain Anesthesia."

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TO THE EDITOR OF THE DENTAL COSMOS:

Sir,—I read with a great deal of interest the article on the preparation of novocain solution, by Dr. C. E. Kells on page 818 of the July COSMOS.

In the paper Dr. Kells mentions an instance in which a patient who was being operated upon under novocain conduction anesthesia showed signs of fainting, and who was quickly revived without interference with the surgical preparations by the administration of a few drops of aromatic spirits of ammonia by means of a glass syringe.

For the benefit of those who are interested in novocain and for those who are about to take up its use I may say that for a number of years it has been my practice to give my patients a half-teaspoonful of aromatic spirits of ammonia

in half a glass of water ten to fifteen minutes before injecting the novocain solution. In following this plan I have not been delayed, have had practically no symptoms of fainting, and the results altogether have been most satisfactory to myself and my patients.

Aromatic spirits of ammonia is a perfectly harmless preventive and I can see no reason for waiting until the patient shows signs of fainting before administering the drug.

I am sure if the members of the dental profession who are using novocain will try the plan I have suggested, they will be more than pleased with the result.

H. M. BECK, D.D.S.

68 W. NORTHAMPTON ST.,  
WILKES-BARRE, PA.

## “Vincent’s Angina.”

TO THE EDITOR OF THE DENTAL COSMOS:

*Sir*,—The following extract from a book entitled “Wild Flowers as They Grow,” by H. Essenhig Corke, F.R.P.S., and G. Clarke-Nuttall, B.Sc., may interest your readers:

Said Old Cole in the reign of Charles II (A. D. 1630–85): “Self-heal” is called by modern writers (for neither the ancient Greek nor Latin writers knew it) Brunella from Brunellen, which is a name given to it by the Germans because it cureth that inflammation of the mouth which they call “die Breuen,” yet the general name for it in Latin nowadays is Prunella as being a word of more Gentile pronunciation.

As to the disease referred to:

“It is common to soldiers when they lie in camp, but especially in garrisons, coming with an extraordinary inflammation or swelling as well in the mouth as throat.” The implicit faith of our forefathers in the herb as is exemplified in the name “Self-heal,” “All Heal,” “Hook Heal,” “Slough Heal,” was probably rooted in some measure of fact. The Old Herbalists were so explicit on the point and appealed so confidently to experience. “There is not a better wound herb in the world than that of self-heal, the very name importing it to be very admirable upon this account, and indeed the virtues do make it good, for this very herb, without the mixture of any other ingredient, being only bruised and wrought with a knife upon a trencher or the like, will be brought into the form of a salve which will heal any given wound even in the first intention.”

Self-heal is one of those hardy immigrants which have found their way into North America. It is there known as “Heart of the Earth” as well as by the

pretty and not inappropriate name of Blue Curls.

There is nothing new under the sun. There is plenty of evidence in the by-paths of literature to prove that Vincent’s angina, Vincent’s disease, stomatitis, acute infective gingivitis, scurvy of the mouth, or whatever one likes to call it, has plagued armies from the dawn of history to the present time.

I served in the British Army during the war and at different times treated a large number of men for “trench gums.” I had not the time nor facilities for determining the species of bacteria present, but found Talbot’s glycerol of iodid very effective in destroying the bacteria. Hydrogen dioxid was given to the patients as a mouthwash.

I advised change of diet, fresh fruit and vegetables, and careful cleansing of culinary utensils. In some cases instead of Talbot’s solution I used the well-known formula containing liq. arsenicalis, vin. ipecac. and glycerin, and when I could not get these prescriptions dispensed, I used liniment of iodine. One of the worst cases I remember was that of a Cameron Highlander who had been on bully-beef and hard-tack diet for about three months. He had a full complement of teeth, all sound. In my general directions I mentioned the names of different fruits. He reported a few days later with the mouth healing beautifully. He told me that he had only been able to obtain lemons and that he had brushed his teeth well with the juice. Of course he had misunderstood my instructions, but I leave it to your readers to argue whether or not the juice had any benign local action on the gums.

Yours faithfully,

C. C. MARSTON, L.D.S., R.F.P. & S.  
40 LONDON ROAD, GLASGOW.

# PROCEEDINGS OF SOCIETIES

## Pennsylvania State Dental Society.

Fifty-second Annual Meeting, held at Reading, Pa., April 27-29, 1920.

(Continued from page 1004.)

### WEDNESDAY—*Evening Session.*

President Schlegel called the convention to order and introduced Dr. EWING T. BRADY of St. Louis, Mo., who read a paper on "Why do Root-Canal Fillings Fail and Place Us Open to Criticism?"

[This paper was published in full at page 1081 of the September issue of the DENTAL COSMOS.]

It was moved, seconded and carried, that a vote of thanks be extended to Dr. Brady for his excellent paper.

Adjourned until 10 o'clock Thursday morning.

### THURSDAY—*Morning Session.*

Vice-President Dr. R. H. D. Swing called the convention to order at 10 o'clock.

Dr. SWING. Owing to the absence of your President I have been asked to open the meeting this morning. We are highly honored in having with us this morning a distinguished dentist from Indianapolis, Ind., and it gives me very great pleasure to introduce to you Dr. CARL D. LUCAS, who will read a paper on "Bacteriology of the Periapical Tissues of Pulpless and Viable Teeth."

[This paper is published in full at page 1197 of the present issue of the DENTAL COSMOS.]

### DISCUSSION.

Dr. J. F. Biddle, Pittsburgh. The two salient points that have appealed particularly to me in this admirable paper of our essayist are: (1) Complete clinical histories of cases; (2) bacteriological investigations.

The average dental practitioner is lax in taking histories of cases, which in view of present-day investigations and findings is greatly to be deplored. The medical profession so thoroughly realizes the far-reaching results in this particular, that the Board of Medical Licentures of this State makes as one of its requirements, in order that a hospital may rank in "Class A," the stipulation that it keep on file complete clinical records of all patients admitted thereto. This history of a patient must be taken within twenty-four hours of his admission to the hospital; all clinical findings must be recorded, as well as complete history to the minutest detail and this chart must be signed by the chief before the patient may be discharged.

There is a certain society of surgeons which makes, as a requirement for admission to its membership, the qualification that fifty history charts be furnished by applicants.

These facts are merely indicative of the value placed upon histories by our medical co-workers, and we should be equally zealous in securing data that will



enable us to labor intelligently for the correction of many systemic disorders, and also for the advancement of our profession from a scientific standpoint.

Bacteriological investigations are second in importance and will rapidly eliminate the cursory judgment engendered by haphazard methods previously employed in diagnosis and treatment. It is not feasible nor essential that every dentist's office be equipped with a bacteriological laboratory, but dentists of every community if they are to render adequate and intelligent service to humanity, should at least, have access to one.

In large cities such laboratories could be equipped by the dental colleges and would be of inestimable value both to the college and the dentist.

In other localities not so favorably situated, such laboratories might be established in connection with local hospitals, where dentists desirous of so doing might readily familiarize themselves with the requirements necessary to properly secure swabs, sections, etc., and transmit them to laboratories for examination and report.

To one who engages extensively in this important line of work, a laboratory and technician under his special direction for detail work would be indicated, but this would not necessarily mean that it would require a great deal of the dentist's time, especially since there are so many other departments of his practice in which his personal skill and attention are absolutely demanded.

Our essayist says that cultures from previously resected roots are, in the majority of cases, positive. I am greatly interested to know how he has arrived at this conclusion; whether he has reopened the areas at the apices of apparently healthy resected roots and secured his specimens, or whether he has extracted teeth which showed no rarefied area at the apices of the roots. To my mind the only way, in such a case, to secure specimens of value, is to reopen the tissues, or to extract apparently healthy teeth, and I have yet to find a private patient who is willing to sacrifice

a tooth for the possible aid to scientific knowledge accruing thereby.

I agree emphatically with our essayist when he says: "Facts, not individually expressed opinions, must be our slogan." Too many men are stating their opinions as facts, making bald statements without substantiating their claims, and apparently expecting the profession to receive them as the last word on the subject. I believe the only way to secure knowledge of real value on conditions at the apices of pulpless teeth is to attempt to procure patients who place no value upon their teeth, and who, possibly, in return for financial remuneration would be willing to allow an operator to treat abscesses, devitalize and fill root canals and, in periods of from six months to two years, extract these teeth and submit them to all known tests.

If radiographs show these teeth apparently negative before extraction, while laboratory findings are positive, there would then be some conclusive proof upon which to base our claims.

Often one discovers teeth with perfect root-canal fillings, which when radiographed show abscesses, and a specimen from which will produce a growth, but these facts do not add to our scientific knowledge, from the fact that it is not known when and under what conditions the roots were treated and filled.

May I cite one case illustrative of the value of history:

Young woman, nineteen years of age; upper left second bicuspid was extracted; apparent disturbance in this region for about six weeks thereafter; socket was irrigated daily with physiological salt solution; socket curetted and dressed with eufroform paste by her dentist. Finally referred for diagnosis and treatment.

History showed girl had been very nervous and irritable for preceding two years, had lost considerable weight, and during all this time had been under the care of the family physician, but with no beneficial results. Her mother had had an operation on left maxillary sinus for empyema (primary cause, bicuspid tooth) about two and one-half years previously. The young lady was sure her trouble was of the same origin.

Oral examination, transillumination and

radiographs eliminated the theory of sinus involvement, also there was no infection of hard and soft tissues surrounding the socket. The young woman was sent to a hospital for observation and it was found she had adhesions, tubercular ovaries, and the uterus considerably misplaced. She was operated upon and the attending surgeon reported that had the operation been delayed two months, the patient would have been beyond medical aid.

The state of her health produced by actual conditions, as well as the local disturbance in the maxilla, together with the fact that her mother had empyema of the maxillary sinus, influenced her to believe that her condition was the same. The tooth socket was disregarded, the patient recovered from the operation and after treatment she had, upon last report, regained her health.

Many other cases of various kinds might be cited, where thorough physical examination, including X-rays, has saved the patient from great inconvenience, and in some cases, probably from death.

**Dr. Carlton N. Russell**, Philadelphia. *Mr. President and Members of the Pennsylvania State Dental Society*,—I have listened with much interest to the paper which has just been presented and I wish to tender my compliments to the essayist on the valuable facts deducted by his most careful and thorough investigation of this very interesting subject.

There are some parts of the paper, however, which impress me as being quite expansive, and doubtless impinge more or less freely upon the medical field.

In late years many writers have developed a tendency to invade with much temerity the somewhat mysterious sanctity of the laboratory, from which place is brought to light many startling deductions which have the tendency to cause the dental practitioner to recoil upon his own handiwork and, in his confusion, to deprecate many creditable procedures which at the worst are but relatively faulty. It is commendable, however, for investigators to swing well to the extremes, even though abstruse, in order that the horizon of dental and medical knowledge may be enlarged.

When we require of the dentist records of blood pressure, the varying character of the pulse, blood counts, hemoglobin percentages, urine examinations, adventitious cardiac and chest sounds, together with detailed and minute bacteriological findings, we are requesting from him knowledge along the lines for which he was never thoroughly trained. Those who are conversant with the above suggestions can readily appreciate the necessity of the well-coached medical mind that can skilfully recognize all physical pathology as well as bacteriological findings and that can then ultimately make a reliable differential deduction.

The tendency of the present time is the closer correlation of the two branches of the profession, and while the medical practitioner will never become a dentist, nor will the latter ever rest comfortably in the medical sphere, still their co-operation will result in great good to humanity.

At the present time there is a slight confusion existing between these two great callings which is resulting in a serious injustice if not a criminal injury to the laity, namely, the ruthless and wanton destruction of thousands of innocent teeth.

Medical history is punctuated by many discoveries, which when they occur invariably occasion a marked disturbance of the equilibrium of that science. There is a strong tendency to stampede to any plausible new idea that promises to be the panacea for many of the ills which they had been previously unsuccessful in combating. Thus it was with the discovery of anesthesia, function of the ductless glands, X-rays, radium therapy, Wassermann tests for syphilis, salvarsan, Koch's tuberculin, affections of the appendix, removal of tonsils, etc., and now speculation runs rampant relative to the establishment of multiple diseases ranging all the way from epilepsy to blindness, claiming the cause to be focal infection having its incipency in some pathological dental lesion.

Of course in all these things there is much that is good and true, but it is not all good and true. The known crim-



inal is given credit for all misdemeanors, although he may be guilty of but few of them. Time alone will properly adjust many of the mistakes inflicted upon the patient at the present time, and in the near future it will fall to the lot of many to explain, as best they can, to their edentulous clients just what it was all about.

Rosenow revealed some brilliant facts to the medical and dental world which have revolutionized the treatment of many previously obscured ills. Rheumatism, the annoyance of humanity for ages, has received an almost fatal blow. Idiopathic endocarditis has now had its cause made known. The elective power of bacteria has been indisputably proven, therefore, lifting the haze relative to many diseases, such as, appendicitis, cholecystitis, myositis, nephritis, gastric ulcer, erythema nodosum, and many other like affections. He further states that by metastasis, infection may be transmitted from an apical infection and implanted on an otherwise normal root.

It is claimed that bacteria are found on all devitalized teeth, although the tooth may be manifesting no apparent unrest.

Laboratory methods have detected bacterial infection about unerupted teeth.

Autopsies show that about seventy-five per cent. of the subjects who have succumbed from other causes have tubercular areas or old scars, although during life no evidence of pulmonary involvement was suspected.

From most any throat or tonsil may be secured pneumococcus of pneumonia; the disease, however, never having occurred.

Syphilis may have been actively implanted during youth, with death terminating the career of the individual at eighty from other causes.

Much depends upon the resistance of the individual and also upon the virulence of the infection. Antibodies may be developed within the human economy and acquired immunity enjoyed. What is true of the tonsils, the lungs, and specific infections, is also probably true of the teeth.

Extractions should not be performed upon suspicion, nor because a physician wishes to eliminate a possible cause of disease unless the condition is grave enough to justify the experiment. Make sure the tooth is *guilty*, then extract.

I believe there should be specifically determined rules agreed upon by the dental profession under which a tooth should be destroyed. The bacteriological evidence of affection of a tooth, especially in the absence of any untoward physical manifestations, should be well contemplated before the forceps are adjusted. The removal of the tooth on suspicion, or as an experiment, or to eliminate possible causes of infection, may entail subsequent discomfort to the patient far out of proportion to the hoped-for relief.

It is unnecessary to enumerate the sequelæ which may possibly follow the loss of teeth. Every dental practitioner is but too conversant with malocclusion, pyorrhea, changes in the dental arch, irregularities of teeth, facial deformities, possible development of neoplasms, perverted deglutition, faulty metabolism, gastric disturbances, annoyances of artificial dentures, together with numerous other conditions of like character. I do not wish in the least to imply that I am not fully in accord with the theory of focal infection occurring from the oral cavity, as that would be a most ludicrous position to occupy, especially in the light of present-day facts; but I do feel that our imagination is running rampant and to a certain extent has supplanted our better judgment.

It is quite natural that much confusion should exist relative to this subject, principally on account of some very startling facts accruing from reliable investigators.

Prinz states, in one of his published articles, that "Practically all root canals, although they may be aseptically treated and filled, will be found after a few weeks to be again infected with the original bacteria that caused the first infection." He further claims that a "Complete sterilization of the dental tubules cannot be accomplished."

It has also been proved to us that



devitalized teeth with negative radiographic findings commonly yield a pure streptococcus. Again Machat records that striking recoveries have followed the removal of pulpless teeth apparently free from apical involvement.

In all this gloom, however, there comes a ray of light through the assertion of Dr. Noyes, "That the protective action of the blood will usually antagonize the bacterial invasion." He further says, that the streptococci found about the apices of teeth by the microscope and also by the means of cultures may not be so potent a menace to health as we may think. There is usually an immunity of equilibrium. The attenuation of bacteria may cause it to become inert.

Rosenow states, "The administration of properly prepared vaccines may be an important aid in overcoming the metastatic condition."

Again quoting from Dr. Prinz, "One reason why systemic disturbance is not always by known pockets of pus is because of the vital resistance and the attenuation of the bacteria."

I most heartily agree with Dr. Lucas in that part of his paper where he emphasizes the necessity of a most thorough and systematic examination of the oral cavity. Generally more mistakes are committed by the lack of looking than by the lack of knowledge. The dentist is in the position to be the first to recognize neoplasms and particularly those of a malignant disposition.

The majority of carcinomas of the mouth in their relatively early stages have been referred to me by the dental practitioner, while the late cases have come from the medical branch. This remark is not in any way a reflection on the diagnostic skill of the latter, but it is due more to the fact that the attention of the physician had not been called to the growth in its incipient stages. The dentist who is constantly examining the mouth is more apt to have his attention attracted by any unusual change which might manifest itself.

Dental responsibility is no longer limited to teeth alone exclusive of the adjacent tissues. It is just as much his duty

to examine the mucous coverings of the mouth, the gums, the tongue, the floor and roof of the oral cavity, the tongue and the tonsils, and to make a complete and comprehensive record of the same, as it is to record the condition of any particular tooth. On account of the frequency with which the accessory, and more especially the maxillary sinus, becomes contaminated from tooth infection, a broad knowledge of the pathology and the concomitant symptoms should be attained.

Dentistry has its limitations and these boundaries should be respected, but the practitioner of today can no longer alienate the teeth from the rest of the economy with impunity as was once the custom. It is not so much the duty of the dentist to make positive diagnoses as to suspect abnormal or pathological changes in the oral cavity and then refer the cases to the proper specialist. The tendency at the present is for more extended medical training, and I believe this very trend can be overdone and should be sufficiently guarded against lest the understanding of dentistry becomes perverted and we lay more stress on medico-dental knowledge than we do on mechanical skill.

I wish once more to compliment Dr. Lucas' paper. It opens up a broad field and will furnish food for thought for both branches of the healing art.

A MEMBER. I would like to ask Dr. Lucas whether the blood cultures taken from these patients, from which he took the focal cultures showed any bacteria?

**Dr. W. A. Jaquette**, Philadelphia. Mr. Chairman, I would like to ask Dr. Lucas to outline his treatment in the reduction of the infection after the extraction, when the culture shows positive.

**Dr. Hayes**. If an infection is found at the base of the sockets from which vital teeth have been removed, how do we differentiate to determine the existence of organisms in the sockets and how long does it take?

**Dr. Lucas** (closing). *Mr. President*, I think the essential part of any paper is the discussion. Dr. Russell referred

to generalized infections which might produce systemic sequelæ. Of course, we know that teeth are charged with many of the ills to which the human race is heir, but when we have a case presenting for examination and diagnosis of the mouth conditions, we feel it is the duty of the dentist, who professes to give a report which is reasonably logical, sensible and scientific, to go into the case and carefully produce all of the evidence of oral sepsis intelligently with tabulated clinical record of all the foci in the mouth. He must realize the fact that the patient's physical discomfort may not entirely be attributed to the mouth conditions but possibly to other generalized conditions. It is our duty to relieve the patient of mouth sepsis. This is our first duty to the patient. One of the first fundamentals learned in dental college was that wherever infection is present it should be eradicated. I have tried to follow that precept ever since I have been in practice. If we can relieve the patient of mouth sepsis even though he may be sure that there are other foci of infection throughout his body, we have done the patient a service which is indeed valuable. By recognition of oral foci and their eradication, we assist the patient by relieving him of a portion of his toxic load, thereby assisting him in combating other possible focal infection throughout his system.

I wish to go on record as saying that it is our absolute duty to relieve our patients of oral infection when we find it. If we find other foci or in our clinical examination get a history of an infection in any other part of the body, it is our duty to refer the patient to medical specialists. I find many conditions existing among a certain group of patients which demand attention from internists and specialists. One of the discussers spoke of fads in dentistry. I feel sure that he did not mean to infer that oral focal infection is a fad. When we combine clinical evidence with laboratory findings and post-operative results, we unquestionably prove that oral

focal infection has a direct bearing upon general physical diseases.

One thing which I wish to clearly express is this: The case records which I presented today are records of conditions which existed in the mouth of patients due to dentistry as practiced in the past. I would not leave the impression that the dentistry which is being done today is producing conditions such as I have indicated in my reports. These records are from cases treated by obsolete dental techniques, and do not represent end results of modern dental practice. Our present practice of dentistry represents the results of modern methods and the future will not reveal such errors. We are now doing scientific work. In the past we did not pay much attention to surgical technique in our work. It is necessary to follow the principles of surgical asepsis in pulp canal technique and oral surgical techniques, and generally dentists are operating according to these fundamental principles of surgery. The bacteria found at the ends of pulpless teeth were, no doubt, quite frequently carried there by unclean instruments, unclean dressings, and faulty technical procedure.

Dr. Biddle emphasizes the importance of the dental profession making more careful clinical records of the examination of patients before trying to relieve the patient of infection which may be present. Reference was made to the advisability of dental offices generally having bacteriological laboratories. The reason I presented the subject of periapical bacteriology was because at the beginning of my investigations I wished to know exactly, so far as I was able to deduce, the true status of conditions existing at the apices of teeth. We realize that each of us cannot have a bacteriological laboratory in connection with our offices, but each of us can have access to a laboratory when occasion demands.

The question was asked how to determine an infection at the base of a resected root. In six months after root resection, have the patient report for bacteriological determination of existing



conditions. Trephine into the periapical space and make a culture, incubate, mount and stain the possible growth and make your determination bacteriologically. All reports on resections were made after the teeth were removed. The case records which I presented were case records of the general run of patients, not selected cases. I have a great many bacteriological reports which I did not present in the lantern slides, with a complete record of all bacteriological findings, which will be presented at some future time.

Dr. Hayes asked the question, "If an infection is found at the base of the sockets from which vital teeth have been removed, how do we differentiate to determine the existence of organisms in the socket, and how long does it take?" Incubation of cultures from such sockets and a bacteriological determination twenty-four hours after incubation will

determine the pathology. I have never made a culture from the end of a clinically normal, vital tooth that was not negative bacteriologically. If there is no excessively large cavity which might encroach through the pulp, and the pericementum is intact, our cultures from vital apices are negative. I do not wish to present padded reports. I think the solution of the problem of mouth sepsis is this: We must educate the general public that they must never let their teeth ache; that they must have their teeth examined twice a year and we will do well to adopt the slogan, "Never let your teeth ache. Ask your dentist why."

#### MOTION OF THANKS.

It was moved, seconded, and carried that a vote of thanks be extended to Dr. Lucas for the paper which he read and for being present on this occasion.

(To be continued.)

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## Dental Society of the State of New York.

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**Fifty-second Annual Meeting, held at Albany, N. Y., May 13, 14, and 15, 1920.**

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(Continued from page 1139.)

#### FRIDAY—Afternoon Session.

The President, Dr. Gould, called the meeting to order at 3 o'clock.

President Gould stated that he was using as a gavel a turnkey, the first contribution to the Dental Museum in the Educational Museum, the same being presented by Dr. A. S. Smith of Oswego. The turnkey was found at Fort Ontario in 1839.

The President read a telegram of greeting from the National Dental Association.

The PRESIDENT. In one of the papers yesterday afternoon, and in the discus-

sion, reference was made to our Group Liability Insurance. Some thought there should be provision made for a greater amount of insurance, if it were wanted. The Company will arrange policies for from \$25,000 to \$60,000 for anyone who wishes it. They will circularize the society later, and give the rates for the different amounts of insurance.

Dr. NORMAN B. NESBETT of Boston then presented a paper on "Cast Clasp Technique and Removable Bridge Work."

[This paper is published in full at page 1222 of the present issue of the DENTAL COSMOS.]



## DISCUSSION.

**Dr. J. W. Beach**, Buffalo. The subject under discussion is one of peculiar interest to me having, for more than twenty years, been a firm believer in and an ardent exponent of the clasp as a means of retaining removable bridge work and partial dentures. Therefore, I congratulate the Society on having Dr. Nesbett present this subject and rather regret that I cannot disagree with him sufficiently to develop a spirited controversy.

My experience with the cast clasp is limited, but so far as I am able to determine, the results secured by Dr. Nesbett are equal, if not superior, to those of others in this field.

Dr. Nesbett frankly defines the limitations of the cast clasp. This form of clasp for the retention of supplied posteriors manifesting certain favorable conditions of the abutment teeth is doubtless the best form that can be used. However, it is little, if any, better than the conformed clasp if the requisite technique is not observed or the proper alloy of casting metal is not used. Unless able to conform to these requirements one had better anchor his faith to the conformed clasp.

Dr. Nesbett's distinction between the clasp bridge and clasp partial denture, should be taken as standard. When the clasps support and retain the piece, with or without the saddle, it is a removable bridge; when the saddle gives more than fifty per cent. of the support and stress and the clasps are utilized for retention only, it then becomes a partial denture.

Only a short backward leap in time revives the period when the clasp in any form was in dark disrepute in the profession. The man who started the metamorphosis, which has since taken place, was the late Dr. Bonwill. That change pivoted on the addition of the occlusal or finger rest to the ordinary circular clasp then in use. This immediately brought about two vital changes—it overcame undue gingival pressure and permitted a narrower clasp to be used. This is known as the Bonwill three-point

contact or stop rest clasp and may be termed the universal clasp of today. What tomorrow may bring forth will be another story and doubtless the name of Dr. Nesbett in connection therewith will frequently appear. However, the ideal universal clasp still remains to be developed.

The cast clasp is essentially one of continuous contact which, in accordance with the technique followed by Dr. Nesbett, has three points of accentuated contact, as it were, with the tooth surfaces. These points are, respectively, the occlusal rest and the ends of the open arms of the clasp and thereby may claim slight relationship to the Bonwill clasp. Theory and practice are at variance in relation to the grip upon the tooth necessary for retention of the bridge. One of the important facts determined by the method of Dr. Nesbett is that only slight hold is required by the cast clasp and proportionately is this true of the wrought clasp.

The success of clasping depends upon the exactness of adjustment in relation to the different forces influencing the movement of abutment teeth. Natural occlusion of these teeth should be carefully noted and an additional inclined plane should not be established by which undue pressure will, in masticating, deflect the tooth from its position. This is an essential consideration.

Without doubt, the amalgam working model is the most dependable kind upon which to construct the cast clasp. For the conformed or wrought clasp, Weinstein artificial stone we believe to be adequate.

All clasp bridges, whether cast or wrought, should be easy of removal by the patient who should always receive instructions to this end. The round wire conformed clasp is less likely to promote disintegration of the tooth surface than those of broader contact, particularly the cast clasp. I would like Dr. Nesbett to tell us of his experience in this respect.

**Dr. Albert E. Sager**, Rochester. When I was asked by the committee to discuss this paper on bridge work, I

thanked the gentleman for the compliment, and then I wished I had not accepted, when I saw the title of it. I felt I had no right to discuss this paper, because in our office we have had little experience with the cast clasp in its application to bridge work. My first impulse was to condemn it, because we have had quite a number come into the office for repairs, where the occlusal lug had been broken off. The clasps had sprung, allowing the saddle to settle and impinge upon the soft tissues too much, and in some cases (because of poorly made clasps) spreading and loosening the abutment teeth. I might add that I have only seen one of these that was well made—made as our essayist says they should be.

A friend of mine, who always makes everything beautifully, had made one for himself, and I had helped him adjust it by grinding the occlusion a bit. I said: "I am very glad to see you have one of these, because I believe there is a place in dentistry for these appliances, and I have been anxious to see one, properly made, put into use, and where I can check it from time to time and see how it works." I saw him just a year afterward, and asked him how it was getting along, and he said he had it in his pocket and must have pulled it out with his handkerchief and lost it; so I have not had my opportunity.

The tendency with dentists seems to be when they have worked out a new idea of this sort, to make its application too universal, and put it where it was never intended to go; and consequently many failures result. I was glad that the doctor enumerated, among other things, the steps and methods he tried out and discarded. Many times when the technique of such an operation as this is given, and which has only been adopted after much time and labor have been given up to it, Dr. Wise Guy attempts to make one of these things, and short-cuts half of the technique, making a poor job of it as a consequence, and forthwith condemns the whole thing as being no good.

I think this will deceive a lot of men.

It looks too easy. They say: "Why, all you have to do is take a couple of impressions, make a couple of amalgam dies, put the dies on your model, shape it up a bit, and cast the whole thing—saddle and all. Easy steps for little feet!"

To those men I would say, do not make any mistake about this, as there is nothing harder to do in dentistry than this. The intimate adjustment of the clasps to the teeth, the saddle and the occlusal stress must be figured out to a nicety. Just remember that our essayist has been working on this about five years, and that you will not master it overnight. I think that is the trouble with many of the cases I have seen—they failed because of poor construction. I am a good deal like the man who said he did not have a prejudice in the world, but he did hate an Englishman! So I have gone through life with a prejudice against these clasps.

The doctor has given us a better technique than we ever had before. I was going to tell him I would rather any time see a bridge constructed on a couple of mesio-occluso-distal inlays in live teeth, either fixed or removable, using judgment, of course; but when I saw his models, I changed my mind. He has hedged himself very beautifully, and he has fortified himself. Now after seeing some of these models, I am going home, and will make some of them!

I like the definition which someone has given us of genius. It is simply this: "One who takes infinite pains." Our essayist has proved conclusively that he is entitled to the honor to be so classed, and I am sure that this appliance in his hands will do all he claims for it.

### **Presentation of the Fellowship Medal.**

Dr. MEISBURGER. It gives me great pleasure—not to introduce, but to present to you Dr. Harvey J. Burkhardt of Batavia and Rochester, who has been awarded by unanimous vote, the Fellowship Medal for this year.



PRESIDENT GOULD. Dr. Burkhart, in awarding to you this medal, the members of the Dental Society of the State of New York are conferring upon you the greatest honor in their power to bestow. It is conferred upon you as a recognition of your services in the elevation of the standards of dentistry, and your services in the dental societies. You have served in every capacity, having started at the lowest office, served your district as president, the New York State Dental Society as president, the National Dental Society as president, the Fourth International Dental Congress as president, and also served as examiner of the State Board of this State for twenty-two years, having been appointed in 1898. After all these years of service, you are still answering the call of your profession when needed. As director of the Rochester Dental Dispensary, you are doing noble work in teaching the public the value of dental services in the preservation of health, and that institution will stand as a monument in the field of oral hygiene. Any labor required of me in my work this year is more than compensated for by the honor I feel in being allowed to present to so worthy a recipient the Fellowship Medal of the Dental Society of the State of New York.

Dr. BURKHART. *Mr. President*, my old friends,—I feel very profoundly the fine tribute which the President has paid to me, and the very complimentary remarks which he has made. I do not think I really deserve all the compliments which he has paid me, but I am willing to accept them just the same. It is a very proud privilege to receive this recognition from the members of this State Society. The first meeting which I attended was twenty-nine years ago this year, and was presided over by my old friend, Dr. William W. Walker. I have known more or less intimately every succeeding president of the New York State Society. I have been in very close touch with its work, and I am very proud to say that I have never had the privilege of working in any organization with as fine and loyal a lot of men as

we have in this State Dental Society. I recall very well the condition of dental affairs at the time I came into this work, and I have observed with a great deal of satisfaction the trend of events upward in dentistry, and the elevation to its present high status of dentistry, not only in this State, but throughout the country.

I recall with more or less sadness at this time, the memory of those with whom I have been associated, who are not here today. Many of you knew the older men, who were active in dental affairs twenty-five or thirty years ago, and what they did for the profession, and I want to pay my tribute to those who, in the early days, labored so unceasingly for the advancement of everything pertaining to dentistry.

My associations with you have always been very pleasant. There were times, years ago, as many of you recall, when we had in our State Dental Society affairs something that used to be known as politics. Very happily, I think, much of it has been done away with by the present organization of the State Society, and the present plan has done much to take the business cares out of the society meeting itself, so the time can be more generally devoted to the scientific and the practical part of the program.

I also recall the many little run-ins we used to have, and the bitterness that was engendered, and I am sure you will all agree with me that for some time past, there has been very little of that; and having a fairly good knowledge of dental society matters in other States I am very frank and very free to say that there is no dental organization of which I have any knowledge that is comparable to the Dental Society of the State of New York in the harmonious feeling and spirit prevailing. This to a considerable measure has been due to the tact and the ability of the presiding officers of your Society for some years.

It is a very happy moment for me, to be initiated into the band of fellowship which was established by my dear old friend, Dr. Jarvie, some years ago, and to know that I am on the list with



those who have been recognized in the past. It is also a source of great pride to me to know and to feel that I have had the high privilege of the acquaintance of every man who has been created a Fellow of the Dental Society of the State of New York. I think Dr. G. V. Black was the first Fellow, and I recall with a great deal of satisfaction the pleasant acquaintance I had with him.

It is true, as the president stated, that I have been active for some years, and it has been my very great satisfaction to be privileged to be active by your graces, and by the kindly attitude which you have always assumed toward me. I have never taken myself seriously—I have felt my own limitations; but I have tried to make up for the shortcomings which I know I possess by as much enthusiasm and energy as I was able to put into the work, and I hope I shall be able to continue in harness for a great many years.

It is a very proud privilege for any man to number among his friends the friendship of an organization like this, and I feel it very profoundly. I am deeply appreciative of the kind words that have been spoken by your president, and the kind words that the individual members of this society have spoken to me, and I shall always remember, with the greatest satisfaction and appreciation, all the fine things which you have done for me.

Mr. President, I do accept with the most profound feeling of appreciation, this very high honor which you have conferred upon me.

The meeting then adjourned until 8 o'clock P.M.

#### FRIDAY—*Evening Session.*

The meeting was called to order by the president, Dr. Gould, at 8 o'clock.

Dr. A. W. Twigg, Ossining, read the report of the Executive Council.

Dr. T. P. HYATT, New York City, read a paper entitled: "What is 'Safety First' in the Treatment of Pulpless Teeth or Teeth with Non-vital Pulp?"

[This paper was published in full at page 959 of the August issue of the DENTAL COSMOS.]

#### DISCUSSION.

**Dr. Percy Howe**, Boston. We have all listened with great interest to Dr. Hyatt's exposition, and we know the creditable work and the zeal and the enthusiasm he has put into his work, and his desire to eliminate disease from the human race as much as possible through the teeth. We all have that desire, but I think Dr. Hyatt is placing too much trust in the experimental evidence upon which he bases his theory. Rosenow and others who advocate the focal theory of infection have based their theories upon preconceived ideas—upon unnatural experiments, and it yet remains to be proven that the pulpless root ever causes a heart or kidney lesion.

Before we attempt to explain what primary lesions will cause to other parts of the body as secondary infections, let us see how the primary lesion itself acts. We are ready to explain how infection travels to a far distant point, and causes trouble; but let us see how it acts in the first place in areas of lowered resistance.

The type of microorganism which we have been taught to hold responsible for the general systemic diseases is the *Streptococcus viridans*. The *Streptococcus viridans* is not a distinct organism; it is a group of organisms. There are two divisions of streptococci which are fairly well understood: one is the non-hemolytic, which does not attack blood to any appreciable extent, and the other is the hemolytic, which takes a good clear hold on blood. The non-hemolytic, to which the viridans belongs, are not distinct disease producers. They grow only on diseased tissue. The hemolytic, on the other hand, which we do not find about the teeth, are distinct disease producers, and they cause milk epidemics, septic sore throats, and other infections which you hear about. When you have a septic sore throat, you find a hemolytic streptococcus, and as the throat gets well, there is a return in the

flora to the natural non-hemolytic streptococcus. The non-hemolytic, of which the viridans is a variety, is a normal flora, and is in everybody's mouth, from youth to old age. In diseases like pneumonia, it is for the time suppressed by the pneumococcus, and the type of pneumococcus associated with the disease lasts for about ten days after the disease, when back comes the streptococcus.

In the experiments of Rosenow, he uses massive doses injected into the veins—in a man of 154 pounds it would amount to from three or four cupfuls to five or six quarts. Those are unnatural conditions. We do not have streptococci anything like that; yet to effect his results he must use those tests. The size of the dose creates a lesion. He regards the bloodvessels as drains. The newly-formed bloodvessels are a sign of healing or restoration, and a large part of the infections diagnosed are merely cicatricial tissue—an attempt on the part of nature to heal up the trauma produced by a root-canal condition.

Hartzell shows that in pulps in the healthy state, he finds infection of the non-hemolytic type. There are times when you find those microorganisms in almost any part of the body. That does not signify disease. The principles of immunity do not work out. What is the trouble—is it with the theory? I think it is with the theory of streptococci. They are undergoing classification today. There is no full agreement on the subject today. The two divisions I have given are fairly constant. The blood tests Dr. Hyatt shows are all very questionable in value, and it is not safe to use a blood test to determine the type of streptococci. The statement he makes, in which he says that from a granuloma pneumonia is caused in the army, is a wonderful statement. There is no pneumococci we know of in a granuloma. Then how could they cause pneumonia? If the pneumonia is caused, what kind of pneumococcus causes it? The type of pneumococcus in a state of health—and I have classified them by the sera furnished by the Rockefeller

Institute, is Type 4—the type least associated with pneumonia.

I do not want to continue a discussion of the focal theory of infection, but I want to impress upon you not to take everything that everybody hands out to us as absolute truth.

Any one of these diseases which have been attributed to the teeth, we are very ignorant about. Rheumatism for example; there is a theory, especially in the West, that it is due to infection, that it is due to a short chain streptococcus. In France, they think it is due to a mixed infection. In other parts of the world, they think it is due to some other kind of infection. Others think it is not due to infection at all. I think if we would accept the fact which is proven time and time again, that they are secondary invaders, and not the cause, we would be proceeding on a sane basis.

The only way they can be made to grow in healthy tissue is to bruise the tissue by trauma.

**Dr. J. Oppie McCall**, Buffalo. The question of streptococcus infection is not proved finally, as Dr. Howe has told us. On the other hand, when anything works out consistently in a clinic it is true, I do not care whether it is acceptable to bacteriological theory, whether the experiments on which it is founded are said to be unnatural, or not—if you can work it out in the clinic time after time, there is truth in it. I have seen these cases. I have patients referred to me for systemic diagnosis and have seen this theory work consistently. The work Dr. Hyatt has done in getting up these charts is a splendid work. I have come to exactly the same conclusions in a little different way, and have expressed myself along the same line in Buffalo.

Now regarding pyorrhea, because I think I know something about that, even if I do not know about streptococci, Dr. Howe says the bacterial element is not the primary cause of pyorrhea, and he is right. It is a complex proposition; there are always several causes. There must be a lowering of tissue tone, and then the tissue becomes invaded by the organ-



ism. But there is more of an analogy between the infection around these loose teeth and the secondary streptococcus infections than Dr. Howe would have you believe.

He says you must injure your tissue in order to have streptococcus grow on it, and I think he is right. You do not need to think very long to know that you can injure any tissue in the body by overwork, misuse, lack of use, from the top of your head, where there is no hair, down to the bottom of your feet.

I believe thoroughly that that is the reason why we have secondary foci of infection. It is a primary injury which has given the streptococci a chance to get into the tissues, and a secondary injury which gives them a chance to invade some other body tissue.

With all respect to the wonderful work Dr. Howe has done, I want you all to think very carefully before you discourage the focal infection theory, because it will work if you apply it consistently. And you must go according to what Dr. Hyatt has given you. If you will take these charts to your office, and apply them literally, you will get results that will surprise you.

Dr. Howe says the results Dr. Rosenow gets are unnatural, in that he gives an unnatural dose and introduces it intravenously. He states very truly that in periapical lesions we do not get such a quantity. On the other hand, although the infection is not being poured into the bloodstream a cupful at a time, it is being poured in in a small amount for years and years. If you can demonstrate facts by introducing into a healthy animal large doses, and produce the results that Rosenow produces, you have done something.

I do not want to take the discussion of Dr. Howe's remarks out of Dr. Hyatt's hands, because I know he can take care of it, but it seems to me the focal infection theory is just as logical as that two and two make four.

**Dr. H. J. Kauffer**, New York. I highly respect Dr. Hyatt and his findings, but my ideas are in sympathy with Dr. Howe, and we are looking for the

truth. Dr. Hyatt has told us about the complement fixation and the blood count. I have investigated that matter, and in mouths where we had a great number of periapical infections, where we would expect to find a high leukocyte count, the count was from eight to ten thousand, with six to eight polymorphonuclei. After that tooth was extracted, we had from twenty to twenty-two thousand leukocyte count, with seventy-five to eighty-five polymorphonuclei.

When we stop to consider the etiology of leukocytosis and periapical infection, it is quite clear. Leukocytosis is brought about by the destruction of the cells by the organism. During that process, a chemotactic substance is produced, which encourages the growth of the leukocytes which are hurried to the invaded area, and during that period we get a higher count. When we consider periapical infection which is walled in, so that the organisms cannot attack the tissue cells, and there is no chemotactic substance produced, there is no leukocytosis; but when the wall is broken down, and that is released, we get a high leukocyte count. That I think is the true explanation of my findings.

With the complement fixation, we have a recognized variety of streptococci, but the only positive means we have of arriving at any valuable complement fixation is to use the organism found in the focal infection as an antigen.

In many of those cases, Dr. Hyatt showed to us, there was no recognized organism in the foci. Therefore we could not use that. Also the Wassermann test, which is probably the most universally known, is not completely reliable. The presence of alcohol and toxins will influence the reaction of the Wassermann test. If there are direct manifestations of syphilis with a negative Wassermann, we must recognize that patient as having syphilis and disregard the Wassermann reaction.

\*Therefore these tests are only of negative value. If they are positive, we know they are of value, but the complement fixation is of no value when negative.



**Dr. M. L. Rhein**, New York. It is impossible to discuss this paper as I would like to, and I just want to say a word or two in regard to one point of it. About thirty years ago, I started drawing the attention of the profession to the subject of focal infection in various forms, and distinguishing between focal infections and mouth sepsis, that is, the result of some general form of malnutrition, as expressed so well tonight by Dr. Howe. At that time I had no idea that there could be any possibility of the facts in this case leading any body of men to the extremely radical position that is assumed today by a large number of dentists aided largely by ignorant medical men. The thought I want to introduce tonight is this: In my forty years of practice, not only in our own specialty but in other parts of the body, I know of no surgery that requires more skill, more time, and more patience than the correct handling of a pulpless tooth. I have so frequently summed up the three requirements that place a pulpless tooth in a position where it is by far the safest tooth in the human body so far as causing infection is concerned, that it is needless to repeat it here. Briefly, however, they are the removal of every particle of organic matter from the canal, and that means exactly what Dr. Howe said tonight, the eradication of every particle of diseased area in the periapical region, and the encapsulation of all foramina leading to that tooth. If this is done, that tooth is absolutely secure against possible infection.

In the attempt to do it, we meet with a percentage of failures, the causes of which I cannot take the time to go into. These percentages are often exaggerated, but a large number of them are due to the lack of proper training by those who attempt to treat such teeth, largely because of the fact that the temperament of certain men makes it impossible for them to do operations which require the great amount of patience to carry such operations to a final successful issue. And I wish to say here, now, that a large amount of this present demand

for the universal extraction of teeth which have no living pulps has been brought about by a class of men who despair of accomplishing this object.

I agree with the essayist that the principal thing is not my interest, nor your interest, nor the profession's interest, but the interest of the patient—and that is the one thing as professional men we must never forget; that is the only interest to consider; and the only solution of this problem lies in the fact that this operation is bound to become a specialty within our specialty, and those of us who, for various reasons, fail to realize the possibility of doing this work, should leave it alone, and relegate it to those who are constituted to do this work successfully. We should not, however, degrade dentistry by making statements and establishing cults against the preservation of teeth that can be preserved for the usefulness of human kind. That is the only solution I see.

I want to say one word to Dr. Howe. I never have had the pleasure of listening to a better dissertation on the bacteriology of this subject than that he favored this audience with tonight; but he convicted himself in part in his denial of the possible toxicity of the *Streptococcus viridans*, when he said very truly that the hemolytic streptococcus is the one form that produces disease on healthy tissue, and the *Streptococcus viridans* only feeds on decomposed organic tissue. This is the weak point in his armor in the past, and tonight he admitted the fact that we have claimed so long. We know the mouth is full of the non-hemolytic streptococcus. It works through all the tissues. It wants to remain in existence. It seeks pabulum that it shall remain alive, and it goes through the system and dies unless it comes in contact with some decomposed organic tissue. When it comes in contact with a pulpless tooth, at the end of which there is a granuloma, or if it can reach the foramen of a pulpless tooth, there it finds pabulum that will keep myriads of these bacteria in existence, and the reason why that form of strepto-

coccus is as the essayist has said, under such conditions, the most virulent bacteria the human being can be subjected to, is because it is locked in there as securely as anything is locked into a safe, and the toxin emanating from it has no drainage. That absorption of poison goes on as Dr. McCall has said, little by little, until some weak part of the system is bound to be undermined by it.

**Dr. H. Sheinman**, New York. It may seem out of place for me to attempt to discuss this tremendous subject after these brilliant speakers have spoken, but I am going to take refuge in that old saying, that out of the mouths of babes and fools wise things come forth.

We have heard two very eminent men speak on this subject. I regard both of them as correct. We have only to use our judgment and link the two together to get at the truth. Dr. Hyatt has taken the stand that infected teeth produce systemic lesions. Dr. Howe has taken the stand that systemic disturbances cause dental lesions. There is no room to doubt that both may be and are right. What concerns us as dentists is—What shall be our attitude? We are face to face with the fact that dental infection exists. What shall we do? What is the point we must work from? The clinical evidence given us by Dr. McCall has been strongly in favor of our action as dentists, and must be given the greatest consideration.

Dr. Howe mentioned that it required an injured tissue for the particular *Streptococcus viridans* to get in its fine work.

The whole subject evidently hinges upon the vital resistance of the individual, and to have that vital resistance it becomes necessary to employ on the one hand the physician to do his share, and on the other hand to employ the dentist to do his share; for regardless of how we try to heighten the vital resistance of the patient on the medical side, it will not cure a granuloma.

Regarding the question of root canals, which interests us as dentists, I have felt that the best of root-canal therapy

performed in the most acceptable manner by the best operators in dentistry, is nothing more than merely a means of reducing to the minimum the amount of infectible material which remains in and about the root of a tooth.

There is only one conservatism to be considered, and that is the attitude of Dr. Rhein. Dr. Rhein's advocacy of root-canal treatment is the only conservatism which we, as dentists, may employ today to guard ourselves. But even Dr. Rhein's method produces an injury, and then Dr. Howe's streptococcus gets in his fine work.

Every substance which we use today in root canals has the physical property of absorption. There is no circulation within the root of a tooth. There being none, and there being present the property of absorption, there must be absorption of body fluids into the root-canal material. If there is root-canal absorption of fluids, there is stagnation if there is no circulation, and there again you set up a focus which may not be so very great as to show destruction by the radiograph, but it must be considered in this light: you must decide whether or not you will fill this root.

If what I have said regarding the stagnation of fluids is true, this one root is a point of toxicity in the body; but very often you are called upon to treat three molars, and then we must raise it to nine points. Not one of you would hesitate to remove a tooth because it has a granuloma and you believe in the insidious action of the contents of that granuloma. Have you ever thought that in two individuals, one having one granuloma and the other having nine points of toxicity the toxicity of the one granuloma may equal the toxicity of the nine?

**Dr. Hyatt** (in closing). I am a little disappointed that no more discussed the subject, because you know as much about it as I do, excepting this: I have been fortunate enough to get into a situation where I am dealing with thousands of cases, where before I had only been dealing with the few that came into my office. If I did not love Howe so much, I would hate him a jolly lot



more. I think he is a terribly dangerous man, and I will tell you why: He has absolutely ignored and thrown to the wind any consideration that there ever was a cure from the extraction of a dead or pulpless tooth. He has denied absolutely, by ignoring it, that anybody has been cured of systemic trouble by the extraction of such teeth. I heard one man say that in New York, but he was absolutely innocent of any accusation of untruth, because he did not know any better. Any one of you has seen one, two or six cases. I did not want to go into these clinical cases, but I am glad Dr. McCall referred to them. If we should bring the clinical cases before you, Dr. Howe would be nowhere, with all his bacteria and diet and everything. He is just as bad at his end as the United States Government is at the other end, when it wants to extract all pulpless teeth; and I want you to occupy a safe and sane position in the middle.

When I tell you there was one girl in the Metropolitan clinic who from 1900 to 1917 never had one year's record when she was not absent for sickness, or at the sanitarium, or in the rest room. The doctor at the sanitarium referred her to the dental clinic, and we found several infected teeth with infected or radiolucent areas, and took those out and cleaned that area, and in 1918 she was not absent one day! Do you dare to tell me it was not the teeth?

In answer to Dr. Rhein, I did not say the treatment of a tooth would not bring about a cure. What I said was this, that there is no evidence and there have been no statistics gathered to show how long a pulpless tooth properly filled can be retained without bringing about some systemic disturbances, sooner or later; and I defy anyone to bring me statistics that are worth the paper they are written on. We have not been at it long enough. It takes years and years to do that.

A friend of mine thinks I am a crank—perhaps there are others. He had heard me lecture before the public, advocating everyone to retain the teeth, that the teeth were so valuable. He also

heard me give some figures that were obtained at the statistical department in the Metropolitan. One day he invited me to lunch, and said: "Do you suppose a person could have neuritis coming from something in the mouth?" I said: "Yes, I suppose so." "Well, my wife has not been able to use her arm for eighteen months. The girls have to cut her meat so she can feed herself with her left hand, they have to dress her and do her hair. Do you think it could come from her teeth?" I said, "I do not know." "Oh," he said, "I thought you said everything came from the teeth." I said, "That is not fair."

I cannot accept the statement of the last gentleman because he has not given enough scientific evidence where he secured that information. He has not shown when that blood count was made, at what hour, what precautions were taken to eliminate uncertainties. We make 200 examinations in the Metropolitan, and from the chemical department and the bacteriological department they claim to have enough evidence to enable them to do it scientifically. There was enough change in the blood, before and after, to make a very careful examination; but the Metropolitan would not put the money in at that time. There is a club in New York that will follow that up.

But to get back to my friend: I asked him to bring X-ray pictures of his wife's mouth. He did so and there were five bad teeth, and a good deal of rarefied area about these teeth. Extraction was advised. The patient had been to five physicians. Two teeth were extracted by Dr. Harry Dunning. A week was allowed to elapse. During that week the patient was able to raise the hand to the chin. Did the teeth have anything to do with it? In another week two more teeth were taken out, and the patient could raise her hand to the top of her head, and in eight weeks that patient could comb her hair, and dress herself, and do anything she wanted to do. You may go out and say Hyatt is a liar, but I know what I know!

Dr. Howe says children have abscesses,



and no physical disturbances, or rheumatism, or anything of that kind; but in the next breath Dr. Howe says all focal infection should be removed. Why should we remove it, if it does no harm? There he goes see-sawing about. That is not right, nor fair. Dr. Howe says he has a diet that will cause cavities in teeth, and then he will change the diet and put the mouth in good condition again. You and I will have to get out of dentistry, and go into the restaurant business! (Laughter.)

How can he come before this audience of intelligent men and show you a lot of pictures, and have the courage to

tell you the teeth do not do any harm at all? All this talk of pulling out these God-given teeth is "bunk."

A lot of men say: "I believe what I see," and out comes every tooth. There are the two extremes: the radical who wants to extract all the teeth, and the conservative who wants to keep them all. Both are doing harm. They should come together, and that is why I offer this, so we can find a safe procedure.

The meeting then adjourned to 10 o'clock Saturday morning.

(To be continued.)

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## Academy of Stomatology of Philadelphia.

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Regular Meeting, Tuesday Evening, May 25, 1920.

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THE meeting was called to order by the president, Dr. Dudley Guilford, at 8.15 P.M.

The Secretary read the minutes of the last meeting, which were approved as read.

The President then called on the essayist of the evening, Dr. EDWIN SHOEMAKER, Philadelphia, who read his paper entitled, "Recent Developments in the Cast Gold Inlay."

[This paper is published in full at page 1178 of the present issue of the DENTAL COSMOS.]

### DISCUSSION.

**Dr. Hewitt.** I have been using the sprue, as you suggest, and there are air cells or holes.

**Dr. Shoemaker.** That is due to shrinkage. You get it with a suction machine.

**Dr. Hewitt.** It was gotten with a pressure steam machine. Why?

**Dr. Shoemaker.** I cannot answer.

**Dr. E. R. Sausser.** Dr. Shoemaker, with his usual ability, has presented a paper in masterly style, giving us the present progress of the correct technique in making gold inlays. It seems to me that he has presented a true standardized technique, which contains, of course, certain set rules, so that the procedure can be repeated time after time with definite and satisfactory results. It would therefore be well for all who are practicing the making of gold inlays in a haphazard, indefinite way to take heed of the different rules as given by Dr. Shoemaker, and to thank him deeply for the opportunity of having before them a definite set of rules.

He mentioned the impregnation of the surrounding walls with the residue of wax. I have never seen it demonstrated as clearly as Dr. Shoemaker did it, when he showed that the absorption of water is made impossible by this impregnation. I have seen Dr. Shoemaker's inlays and many of those made for my office since Dr. Shoemaker has shown

us how to follow his directions have come out smooth, as he says, merely on the removal of the investment with a hand brush. The results, as far as edge accuracy is concerned, have been very remarkable, and the average of successes has surpassed anything that we had had before.

We must not feel, merely because we have had some rules given us and the best methods have been thoroughly surveyed by the essayist and given to us in a presentable form, that we can master this technique in one or two trials. Nearly everyone was misled in regard to porcelain inlays, which were quite popular when first introduced, but ninety per cent. of those who attempted to make them became disheartened, because they found in a few trials that they could not master the technique. In justice to ourselves, the writers on this work and our patients, we should conduct a series of very strenuous laboratory tests before expressing an adverse opinion on the method that Dr. Shoemaker so successfully uses. The results of his experiments are to my mind a vindication of the direct method in every way. I do not think the indirect method has any place at all where the gold inlay is concerned. Any man, who is clever and skilful and understands the materials and principles of the operation concerned, can certainly do better work by making a direct step than by adding two or three steps in the transfer of the impression.

The treatment of the interior of the cavity is very important. When Dr. Shoemaker mentioned his objection to stones, he did not say that he objected to the use of Arkansas stones, which are not being bought as generously as formerly. In fact, in many of the dental houses it is regrettable to find that they are not carried at present because of lack of demand. This is a very sad indication of the spirit of the times, for it indicates that quality is being sacrificed for quantity. The work with the Arkansas stones is as important a stage as any in the preparation of the walls and margins of the cavity. The cleaning of

the button of any old investment material that may be present is very important. The directions for the placing of the wax in the wall by the hot points, following the filling of the indentations made by the explorer, are rather vague, unless demonstrated, but they seem to have a very good principle behind them. The use of the sprue in removing the wax has always been my practice. Possibly I have been at fault in doing it; but this I cannot see. Dr. Shoemaker seems to be of the opinion that it is wrong.

In mesio-occluso-distal cavities we often place two fine sprues, one on each of the proximo-occlusal surfaces. In this way one can delicately withdraw the wax pattern without the danger of distorting it. The nature of the occlusal correcting strip of wax is such that it invites distortion if too much stress is placed on it, as might be the case in using an explorer. Even though a mesio-occluso-distal cavity is correctly prepared, we cannot expect the wax pattern to always drop out as easily as the essayist states.

**Dr. R. E. Denney.** There are just one or two little points that I want to mention, if I may. Since attending the Reading meeting and seeing the demonstrations of Drs. Volland and Thorn I have been working along the lines that they suggested, and I thought that my experience might be of some little help if anyone else cared to work out those home-made devices. It seems very simple, before you try, to make a device that will give you 320° or 340° of temperature whenever you want it, but there is a difficulty in the spreading of the gas flame. If you have a spreader that does not sufficiently spread, you find that your gas flame leaps up above the thermometer. I tried several layers of brass wire without success, and then I tried a sheet of brass with holes bored through it. That spread the flame fairly well, but one day I discovered that the flame had leaped all the way to the top of the oven. The thermometer had also leaped to the top and the bulb was burst, the mercury being inside the oven. Since



then I have used a sheet of metal, which prevented the hot flame from going through. I do not know what Dr. Shoemaker's plan is, but it does not seem an easy matter to keep the oven uniformly heated.

It would seem to be easy to lay out a set of rules that would be so sure that we would not make mistakes, but I think we have a great deal yet to learn about the proper technique. I find a difference in the investments brought about by the way they are waxed. I find that there is a marked difference between putting a certain quantity of water in a dry bowl and in a wet one. If you put it in a wet one, you will have a thinner and weaker investment than with a dry one. I took twenty-eight mils of water and put it in a dry bowl, and I found I had lost one mil when I measured it later. I think we should always use a dry bowl in using a given quantity of water and a given quantity of powder.

The point that Dr. Sausser mentioned about the importance of having the button clean, interested me, as I had an experience in that line that puzzled me. If a button is not clean and we put borax on it, there will be a popping, and little globules of gold will fly around on the workbench. The way to avoid that I found was to have the button clean and not use much borax.

**Dr. J. H. Gaskill.** Dr. Shoemaker's paper is timely and interesting, but I noticed a discrepancy in the time he used to burn out his wax and the time they took at Reading. They claimed that it took an hour and fifteen minutes at 320°, and Dr. Shoemaker takes two hours. I wondered why one took so much longer than the other. I have not used the low-heat method long enough to be satisfied which is better. I cannot see the disadvantage of using the sprue to remove the wax mold. I think there is a greater possibility of distortion when teasing it out. My first efforts were with an explorer or excavator, and I could not get it free as easily as I could with the sprue.

I have experimented with a home-made drying oven and feel that I have

one fairly satisfactory now. I took a vulcanizer thermometer and embedded it in a flask of the size that I use for my investment, placing this in a can, made of sheet iron, on a piece of wire netting standing on legs, which allowed no direct heat to come into contact with the flask. The flasks are not directly on the bottom of the oven, but are held up by the wire netting. The heat is equally distributed, no matter in what part of the can the flask may be.

**Dr. A. Kassab.** I wish to emphasize the fact that a small mold is better than a large one. A brass ring, seven-eighths of an inch in diameter and an inch and a quarter in length, is as large as is best for an ordinary inlay. What we are after in this work is an exact reproduction of the pattern. I cannot agree with the essayist in leaving the pattern in a drawer until ready to be invested. I think it should be invested immediately after leaving the cavity. I cannot agree that castings cannot be made by other methods. I cast in a hot mold. Given a pattern, I make the investment, begin heating, and finish the heating in ten minutes. The mold is then placed under the blowpipe; and three minutes after that, thirteen minutes from the beginning of the investing, the wax begins to burn out, the ring lying horizontally; and six minutes after that, nineteen minutes from the time the investment was mixed, the casting is done and comes out with clean sharp edges and accurate fit. Luck must have been with me. I have had failures, as all have had; but if the investing substance, which is plaster, disintegrates, and the ring gets red-hot, certainly my investing material has all been disintegrated. And why I should get castings of the kind that I will show the essayist, to criticize at his leisure, with the hot flask, which has not even been washed with water, I should like him to answer, if he can. I can finish the casting in twenty minutes, so why should I waste an hour and a half if it can be done in a shorter time?

**Dr. R. S. Clarke,** Mt. Holly, N. J. I have enjoyed this paper very much.



It shows very careful and thoughtful work. I have been doing cast gold work for a number of years in a simplified way, trying to eliminate as many errors as possible which may cause a faulty casting. As time went on I have realized that the weakest link in the chain of steps is the use of plaster of Paris as the binder in all investment compounds. We know that heat contracts, checks, and weakens the plaster, so it is a self-evident fact that the less the amount of heat to which we subject the mold the stronger it will be. Following that thought I have attempted to subject the mold to the least possible amount of heat, both when vaporizing the wax and at the time the gold is fused. When heating the mold to vaporize the wax, it is heated slowly with the least possible amount of heat to cause the wax to disappear, never heating to redness. A visible sign that the mold is ready for casting is shown when a dark brown stain appears at the sprue-hole and the smoking has practically stopped. Overheating is avoided when fusing the gold with a nitrous oxid blowpipe by drawing the melting-tray at least one inch away from the mold, then pushing the tray to position when the gold is fully fused and ready to cast.

I use, as Dr. Shoemaker does, a centrifugal type machine, and I like it not only because I can draw the tray away from the mold, but because the mold is subjected only to the force of the gold actually entering the mold and then only to the minimum amount of force necessary to produce an accurate casting. I agree with Dr. Shoemaker that the finished casting should enter the cavity with the same ease and precision as the wax model left the cavity. Any variation from this is distortion.

**Dr. Guilford.** I just want to say that I owe a tremendous debt personally to Dr. Shoemaker because I went around to see him last fall, and since then I have been making castings that are really castings. Before that I never had many absolute failures; nevertheless, I realized that I had few successes. My castings were perfect in so far as having sharp

edges, but they did not go into the cavity. They did eventually, but I had to spend some time on them. A little relief would sometimes make them go, and sometimes they had to be made over. After I came back from seeing him, I got Dr. Lord enthused and we went after the thing. Now we have inlays that are perfect, and go in readily. If you have not tried it, do it with a cold mold. Do not expect to get it the first time; take your time and work it out, but it is worth while. You will get results you never thought of before, unless they were a whole lot better than we were getting. It is quite possible to get results in any way. It is just like cooking. Some people just naturally cook; but if I did it, I should have to have a recipe book, and then the results would not be very good. Some men might get results anyway, but the point is to have a standardized technique. If you follow this method out and work long enough with it, I am sure you can get results.

**Dr. W. J. Robinson.** *Mr. President, Dr. Shoemaker, and Members of the Academy,*—I would rather not have taken part in this discussion, if Dr. Shoemaker had not told us the method he has shown and described tonight is the only correct fool-proof method to follow.

To say there is only one method for making inlays is ridiculous. Dr. Kassab has described a method with which he has been very successful, and the specimens obtained by this method which he has shown speak for themselves. It is a method directly the opposite to the one described by the essayist, as Dr. Kassab has his inlays finished and ready for cementation in nineteen minutes after he has secured his pattern.

Dr. Clarke has worked out a very clever technique, and it is anything but slow, and those who have had the pleasure of seeing his work know that he gets beautiful results. He has been demonstrating his method to the dental profession for years. Then we have the method where the flask is placed in water and the wax boiled out, then placed on a flame or in an oven and dried and the

casting made. I know operators who are successful with one method and not with another, but that does not prove that the methods are not right.

The method described by the essayist I have used and have had success with, but I have also used all other methods, both hot and cold, fast and slow, burning out or volatilizing the wax pattern, and have had success with each one; in fact, the method I follow depends on whether I use the direct or indirect-direct method of pattern-making and how quickly I want the finished inlay. When casting against gold, as in bridge work, I prefer the hot-flask method. I do not like my inlays to drop into place as easily as those shown by the essayist, but prefer to have to use slight pressure or malleting to seat them. It is very easy to obtain an easy fitting inlay by using the cold ring; this has been demonstrated many times.

In cavity preparation I use inlay fissure burs and stones almost entirely, finishing with Arkansas stones in steel mandrels revolving in porcelain polishing powder. This makes very smooth walls and the smooth walls make a very smooth wax pattern, which makes the removal of the pattern very easy. Smooth walls on the pattern make smooth walls on the casting, and a better fitting inlay is the result, of course. After the inlay is fitted in the cavity, a certain amount of roughening of the cavity and inlay is done, so that the cement will take hold.

I prefer the steam-pressure type of casting machine and I have a little device to heat the gold in, tipping it into the mold, so that very little heat is applied directly to the mold.

I use both the direct and indirect methods of pattern-making, using the latter in all compound or complicated cavities. The essayist has stated that he takes about twenty minutes to carve the occlusal surface after he has made and fitted his pattern; he did not state how long the latter takes. I can take an impression, pack it with a fast-setting amalgam, allowing fifteen to twenty minutes to set, make my pattern, carve

and contour it in a few seconds, and return it to the tooth in the mouth for final judgment; and I have not had to worry my patient with that half hour's work in the mouth. When I am not in a hurry for the inlay, I can lay the impression aside, make the model and the wax pattern at my leisure and at a subsequent sitting try it in, and I can assure you no time is lost.

We will gladly demonstrate these different methods and the technique followed with each one, and I believe we will be able to show that there is not just one way to make an inlay.

**Dr. Shoemaker** (closing the discussion). I am glad I struck a little fire. The paper would not seem to me to be any good if someone had not differed from me.

As to the question of casting in a hot or cold flask, which I will take up first, I want to assure Dr. Robinson that if he will carefully match the two methods, he will find the hot flask will not compare with the cold.

**Dr. Robinson.** We expect to show you in a short time, using the same cavity, that both can be done.

**Dr. Shoemaker.** The whole story is not written as yet, of course. I have written simply what I know about it. I shall be interested to see the experiments to be carried out with the hot flask. As a preliminary exhibit I have both here. One was heated not quite to redness, and the other to 320°. The very appearance of the inside surfaces of the two molds is suggestive to me.

**Dr. Robinson.** There is a great difference in the way it is heated to redness.

**Dr. Shoemaker.** You asked why we take such a long time for heating and suggest that the same result can be accomplished within a half hour. The reason is that the lower heating, and consequently lower temperature required, make for simplicity and exactness. With your method you say you produce the same results in a shorter time; but it is difficult to know just when to stop—just when the wax is melted out. That is why it does not seem as simple and practicable. You are heating the flask



at a relatively high temperature and have to take it out at just the right time. Remember the composition of plaster. If you actually burn the wax, you heat the plaster to  $670^{\circ}$ , which gives the results you see in these soft, crumbling investments here on the table. My main point is that it is easier and more exact to use a technique extending over an hour and a half than one extending over twenty or thirty minutes.

I do not claim, of course, to be an authority on this subject. I am simply going over with you a few things that I have worked out. I unfortunately missed Dr. Volland's clinic at the State meeting at Reading. He is a master in this work. I am giving you the results of a little experimentation carried out in my laboratory. It was not with the intention of insisting that this is the only correct inlay technique, but that it is a very satisfactory one. If anyone uses the hot-flask method and is satisfied with his results, he is not concerned with what we are doing, but I do not think anyone is likely to be satisfied with burning out the wax at an indeterminate heat.

**Dr. Robinson.** Dr. Guilford stated that he now has the inlay drop into the cavity. I believe that is wrong. No inlay can be perfect and drop in. This is a family party, as has been said, and this is the only way that we can get at the bottom of the matter.

**Dr. Shoemaker.** If the inlay drops into the cavity so that the cervical border of the inlay perfectly approximates the cervical margin of the tooth, it will

be a good inlay. We depend on the cement to hold it there.

**Dr. Robinson.** We should not depend on the cement.

**Dr. Shoemaker.** Your point is hardly practical. An inlay cannot depend upon actual retention. It should closely approximate the cavity wall, but you cannot eliminate the space which later is filled with cement to supply the retention.

**Dr. Robinson.** The point you made on shrinkage is the point that takes it up. That is why the cavity wall is polished, so that the wax will come out and the inlay fit the cavity wall. I would not put in an inlay that depended on cement to hold it in, because I do not think it would stay long.

**Dr. Shoemaker.** If the inlay fitted the cervical margin, it would stay a long time.

Now I want to take up the suggestion of polishing the cavity wall. It is a very good point and should be carried out as far as practicable, but like all the rest of our office work, the finishing touches have to be limited by the duration of the particular appointment. In the fight against time all except the absolutely necessary often must be eliminated. For finishing the lateral cavity walls the chisel is recommended; it accomplishes the purpose rapidly and accurately and does not undercut. On the occlusal walls stones or fissure burs may be used. I prefer the latter. Any instruments with which you can make the walls slightly sloping will do.

The meeting adjourned at 9.50 P.M.

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# The Eastern Association of Graduates of the Angle School of Orthodontia.

Eleventh Annual Meeting, held in New York City, May 3 and 4, 1920.

## MONDAY—*Morning Session.*

THE eleventh annual meeting of the Eastern Association of Graduates of the Angle School of Orthodontia was held at the Academy of Music, 17 West 43d st., New York City, May 3 and 4, 1920.

President A. Le Roy Johnson called the meeting to order at 10 A.M., and called Vice-President E. Wildes Swinehart to the chair.

Dr. SWINEHART. The first business in order is the paper by President A. Le Roy Johnson on "Orthodontic Education."

Dr. JOHNSON then read his paper entitled "Orthodontic Education."

[This paper is published in full at page 1186 of the present issue of the DENTAL COSMOS.]

## DISCUSSION.

Dr. Charles R. Turner, Philadelphia, Pa. *Mr. Chairman, Dr. Johnson, and Gentlemen,*—In appearing before a body of orthodontists to talk about anything pertaining to orthodontia I actually feel embarrassed.

To be called upon to discuss the very comprehensive paper presented as the Address of your President still further contributes to my confusion, because I am furnished with a great embarrassment of riches. An analysis of it, however, reveals that there are five constructive proposals or items in it, and these are the items concerning which it is my intention to say a few words. I have

conceived his five proposals to be as follows: First, that there should be an undergraduate course in orthodontia; second, that the object of the undergraduate course should be to present the science of orthodontia as primarily concerned with the study of the growth and development of the human masticatory apparatus, and the treatment of aberrations occurring in this process of growth; third, that the subject matter which is basic to orthodontia is also in part basic to dentistry itself; fourth, that graduate work in orthodontia ought to be given only as advanced graduate work based upon adequate undergraduate training; fifth, that the graduate work should probably be along the line of observation, research, and clinical experience.

In spite of various efforts arising sporadically here and there, and tending to support another point of view, I cannot believe the idea that orthodontia is a part of dentistry will ever be disturbed. I feel that Dr. Johnson's paper this morning is absolutely convincing on this point. If it is a part of dentistry, then certainly the dentist, who is considered qualified under the law to practice orthodontia, should receive instruction in such portions of orthodontia as may be deemed necessary to meet the demands of his position. This will serve first, that he may recognize cases as they develop in his practice, and that he may be able to diagnose the developing deformity, and either personally or by reference to a specialist provide adequate treatment for the case. A more fundamental consideration affecting this point, however, is clearly brought out by Dr.

Johnson in his allusion to the fact that the basic material of orthodontia is also in part the basic material of dentistry itself. To that I shall allude later.

The second proposal as to the nature and content of the orthodontic course for the undergraduate is one in which I have a particular interest and one which interests all of us. Dr. Johnson's proposals along this line are amply sustained by his argument. Why the mechanical ideal has so long persisted in dentistry is not difficult to see, because dentistry originally employed mechanical methods as its chief mode of expression. The advent of bacteriology and the researches of Koch and Miller in the special field following those of Koch marked the first decided effort on the part of dentistry to get away from a purely mechanical point of view. From that time down to the present, with the ever-increasing recognition of dentistry as being primarily concerned with vital problems instead of mechanical problems, there has been great progress. Because of the employment of mechanics in orthodontia, the mechanical idea had greater persistence there than any other phase of dental practice, with the single exception of dental prosthesis. Even prosthesis has to a considerable degree shaken off this burden of a purely mechanical ideal, and from the moment this was done it has become enhanced in grace and virtue. The orthodontist has been compared—and this comparison has been so frequently quoted that it has become threadbare to the average audience—to the accoucheur, whose function is only to superintend the normal process of labor and only has to intervene when this normal process is diverted into some abnormal channel. The point of view of the orthodontist was originally derived from the conception that he was treating a fixed condition. The case presented itself already established and that was the material upon which he had to work. At present his point of view, as all of you gentlemen have so amply demonstrated, is that he should view not with his eye but with a clear intellectual vision the process and

the chain of causation in that process, and should recognize that he is merely the observer of a process of growth and development, the various stages and steps of which are familiar to him, and that each succeeding event may be anticipated. If the course of this process is disturbed he should be in a position to step in and by appropriate measures direct it again into its normal channel. It is not difficult to see why it has taken so long a time to get away from the idea of fixity about the problem with which we are dealing, and difficult to assume just the point of view about which I have been talking. I remember that when I was interested in photography years ago it used to puzzle me why I could never get a successful smiling picture. It never occurred to me until the moving pictures became so common that a smile is not a fixed state; it is a succession of events; it is a process, and the fixed photograph merely portrayed one stage in that process. Occasionally, you may get a smiling photograph which conveys something of the idea of a smile, but it generally suggests something in the nature of a grin rather than a smile. So I think it is not difficult for us to see why it has taken us so long to realize that the problem with which we are dealing is one of growth and development instead of one already developed.

The subject matter of orthodontia as presented by Dr. Johnson is certainly in part basic to dentistry itself. The function of the dentist is to assist not only in preserving the health of the tissues of the mouth and associate parts, but also to preserve or restore their normal functional activities. In order to do this it is quite necessary for him to be familiar with this process of growth and development which eventuates in the establishment of the completed masticatory apparatus. He must know the methods by which this apparatus functions when it is complete, in order to live up to what is really expected of him, merely a general practitioner; and by way of maintaining the apparatus at its maximum efficiency he must have a complete knowledge of what constitutes that



maximum of efficiency. That point is so apparent, I think, that it hardly behooves me to speak of it further.

The problem of orthodontia, as Dr. Johnson has presented it, in the light of its present evolution is undoubtedly the problem of the individual normal. What constitutes the individual normal in this connection? It is not a hypothetically perfect occlusion or articulation. The hypothetically perfect occlusion is an ideal seldom obtainable. Typical occlusion is, as he has pointed out, not always obtainable. The problem before the orthodontist is, of course, what he is aiming at in the individual case. What is the meaning of the term "individual normal" at which he is aiming? The problem which is to my mind the most pressing one in orthodontia is to determine just what it is that you are aiming at for the individual case. What it is that you are trying to bring about, and what you may hope successfully to bring about. We cannot say that the normal for the individual case is that which will bring about the greatest functional efficiency for that case, unless we further qualify the term to mean the greatest functional efficiency obtainable with the material at our disposal. I suppose Dr. Johnson means this when he says the maximum functional efficiency constitutes the normal. Let us admit, then, the use of the word "normal" to designate the maximum functional efficiency which can be established in the masticatory apparatus in the individual case; this, then, is the aim of the orthodontic procedure.

The wide range of variation which we include under the term "normal" is recognized, but we do not know enough about its detail. We do not know when we are justified in calling a state or condition a variation in the normal, nor when it has passed over the line which separates it from the pathological. To further bring out this idea, I will ask your permission to quote from a treatise by Professor Thomas Huxley, on "The Connection of Biological Sciences with Medicine," which may be familiar to you but which is quoted with the idea

of refreshing your mind on this particular item. He says:

The logical connection between the purely scientific doctrine of disease or pathology and ordinary biology is easily traced. Living matter is characterized by its innate tendency to exhibit a definite series of the morphological and physiological phenomena which constitute organization and life. Given a certain range of conditions and these phenomena remain the same, within narrow limits, for each kind of living thing. They furnish the normal or typical character of the species, and as such they are the subject matter of ordinary biology.

Outside of the range of these conditions the normal course of the cycle of vital phenomena is disturbed; abnormal structures make their appearance, and the proper character and mutual adjustments of the functions cease to be preserved. The extent and importance of these deviations from the typical life may vary indefinitely. They may have no noticeable influence on the well-being of the economy, or they may favor it. On the other hand, they may be of such nature as to impede the activities of the organism or even involve its destruction.

In the first case, these perturbations are ranged under the wide and somewhat vague category of "variations"; and in the second, they are called lesions, states of poisoning, or diseases; and as morbid states they lie within the province of pathology. No sharp line of demarcation can be drawn between the two classes of phenomena. No one can say where anatomical variations end and tumors begin, nor where modification of function, which may at first promote health, passes into disease. All that can be said is, that whatever change of structure or function is hurtful belongs to pathology.

Now this presents, I think, the problem which is the function of any orthodontist to determine—What is the pathological and what is within the range of the normal? Dr. Johnson uses the term "normal" to indicate maximum functional efficiency as the criterion of this decision. We must not forget that Nature is rather prolific in her provisions for the successful operation of the several functions which collectively serve to promote the health of the human economy. We must not forget that one individual with an occlusion and articu-



lation which are quite far short of what we might call perfect will be fully capable of executing the masticatory function in a manner satisfactory to the preservation of bodily health. We have a very profound question to decide as to where the maintenance of bodily health is disturbed or where it is satisfactorily preserved. It does seem to me that a large amount of research and observation must be carried on to determine just what is the limit between what may be normal for a given individual and what may be abnormal for that individual. We must not only study the teeth as a part of the masticatory apparatus, but we must study them as a part of the whole digestive system. We must study the whole question of metabolism as affected by normal and abnormal tooth function. Perhaps postgraduate work with the presentation of a thesis may help us in dealing with this problem. But it is going to require a very extended amount of observation of many workers to determine the essence of this matter.

Academically, the so-called postgraduate instruction which we have given in orthodontia, including as it has to a large degree undergraduate work, is perhaps better defined as an advanced course. If the time should come when higher degrees are offered in dentistry, degrees higher than the present doctorate, it may be possible to establish a scheme of postgraduate instruction with appropriate degree, as suggested by Dr. Johnson. That, however, is a long time in the future, and postgraduate instruction in orthodontia will be and should at present be given in order to better prepare men that they may become specialists; but, as he says, this should be based upon a very sound undergraduate course. It is a senseless waste of time to put undergraduate work in a postgraduate course. I strongly hold the opinion that if this body and other representative and authoritative bodies in orthodontia should agree upon what constitutes the basis of undergraduate work in orthodontia, such work will receive the most favorable consideration

by the schools and colleges of this country. It seems to me, gentlemen, that interested as you are in the perpetuation of your specialty by the incorporation in it of representatives adequately trained and capable of undertaking its problems, you are and should be primarily interested in the establishment of an adequate undergraduate course in this subject in the dental schools of this country, because it is only upon a firm foundation of that sort that you should look forward to the building of comprehensive courses of a postgraduate nature. The problem, then, of undergraduate instruction in orthodontia I think has been a very timely one, as presented to you by your President this morning. I should be very glad indeed if you should see fit to take some action of a constructive nature in the way of recommendations as to an adequate undergraduate course to be of inestimable value in promoting the objects and interest of this society.

**Dr. F. T. Murlless**, Hartford, Conn. I am very much pleased with Dr. Johnson's paper, and I am always interested in his method of approach in the things he does, because I think he has rounded up the pertinent facts and has made his deductions from a basis of real knowledge. I think that he really has set an example for the presidents that follow in regard to the annual address, and I cannot help but think that there may be other ex-presidents besides myself who will feel that they have been very much overshadowed in this regard. It seems to me that Dr. Johnson has made a distinction with a comparatively slight difference really, in regard to what he said about ideal occlusion and typical occlusion. We have a few isolated instances of that sort which we might say are instances of ideal occlusion. Dr. Johnson speaks of these as typical occlusion, which, I should summarize as being in his mind a composite of the conditions which exist as he knows them in his practice as within the individual normal. I think Dr. Johnson's definition, the more closely it is analyzed and the more accurately the conditions are separated

which are really recognized as to abnormalities, called variations, will be found not to have been far afield when we have really thought of ideal occlusion as typical occlusion.

In regard to the matter of the degree, I think the experience of the medical profession in regard to the practice of the eye and ear men is really to the point. The medical student reads considerable on the eye and ear, but he does not know a whole lot about it, he has not gone into the work because he is not an ear man nor an oculist, and he has no intention of becoming one, because the history of that particular specialty has been that as an oculist he requires a special operative technique of such a character that the practice of the oculist has been separated from that of the medical man and the general practitioner. Technically, however, the work of the oculist, while standing alone, has contributed considerably to the pertinent facts of the medical man; he has been better equipped because of the things they have done and which he has been able to take over as a medical man, and in just this way orthodontia, to my mind, has contributed a great deal to dentistry. For instance, I think all of us recognize that the knowledge of occlusion that has come to us through orthodontia has been most important and that its influence has been of the greatest value to dentistry; that it has marked an epoch in dentistry to have the laws of occlusion thoroughly defined, and out of it has grown an appreciation of the value of the individual teeth, of the value of perfect contours in fillings, a condition of which we are still hopeful, as I think the time is coming when the improvement is going to be very definite as to the standards in dentistry in regard to fillings, restorations, etc., and they are going to be very much higher than they are now. All this means that the dental student in his general training should be quite capable of the recognition of deflections in the patient which need the attention of the orthodontist; that is, it seems desirable and to be the consensus of opinion that

the dental student should be qualified to diagnose malocclusion. I do not think it is possible to do that without preparation. Treatment after the diagnosis is thoroughly established is a question that is of a mechanical nature and is a different matter.

**Dr. Lawrence W. Baker**, Boston, Mass. This address by our President gives me great hopes for the future of our specialty, for Dr. Johnson has based his address on the teaching of the undergraduate in orthodontia. He has made clear to us that the training of the orthodontist should begin, not with the postgraduate student, but with the undergraduate student. In this he is right—the orthodontist cannot begin the study of this exacting subject too early. It is during the student's undergraduate days that he should begin to shape his course. In fact, it is right here in the general course that the observing teacher should search for orthodontic timber. He should be on the lookout for latent talent, and when the embryo orthodontist is discovered, he should be encouraged, trained, and guided most carefully, for real orthodontic talent is rare.

Of course, Dr. Johnson and the rest of us here this morning are particularly interested in the training of those who are to enter our ranks, but the good of undergraduate teaching does not begin or end with these "sifted few." This foundation course is designed for the general structure of dentistry. The benefits of a well-rounded course in the theory and practice of orthodontia for the general student cannot be overestimated. This matter I dwelt on at length a few years ago, before this society in a paper entitled "Orthodontia—Its Place in Dental Education."

I see another hopeful sign here this morning, and it is that Dean Turner is sufficiently interested in our branch of education to drop his important work in Philadelphia, and come here to discuss with us our own educational problems.

There is still another most promising symptom for the future of our specialty, which hails from old Boston. I am referring to the opening of the Harvard-



Forsyth Postgraduate School of Orthodontia. It gives me pleasure to report that this school is well organized and has begun a most excellent course of instruction. Dean Turner might be interested to know that Dr. Alfred P. Rogers has, through much work, enlisted the interests of many of the best orthodontists along the Atlantic seaboard and middle west. These busy men have dropped their private practices, have come to Boston, paying their traveling and living expenses themselves, and have given most generously of their time and energy to the teaching of those who are to enter our ranks. This is surely a labor of love, for these men do this without pay. To me this is the true spirit of the teacher!

As I have already intimated this morning, I am much encouraged at this educational awakening which is arousing our specialty. I have been struggling along for twenty years, trying my best to teach this difficult subject at Harvard, with very little or no encouragement from my fellow specialists. I must confess that many times during this long period of time I have become discouraged, and have also felt considerable anxiety for the future of our art, but this educational movement indicates that recently others have shared with me this same feeling. They evidently feel, as I have, that there was grave danger of our art dying with us, a mere handful of workers; we realized we were being attacked by that deadly disease, dry rot. But I assure you that if every member of this organization puts his shoulder to the wheel and does his part toward supporting this postgraduate school, there will be no fear for the future of orthodontia.

**Dr. J. A. C. Hoggan**, Richmond, Va. I am very much interested in the question considered in our President's Address. He has handled the subject in a general way. It is the only way in which such a subject can be handled. I do not doubt that a great many schools will claim that at the present time they are teaching all the fundamental principles of orthodontia. A very wide application of the meaning of the principles can be

made. Just how definitely Dr. Johnson would apply the teaching of histology and physiology to or in an orthodontic course is a question I would like to have him answer. Thus, at the present time, with a large part of the dental curriculum it is not impossible to teach the undergraduate all the present principles of orthodontia. It is impossible to give him a clinical experience which enables him to form a picture of what Dr. Johnson calls normal efficiency. You know that a number of men have had considerable training in orthodontia, have gone out and acquired considerable experience, and then dropped it for the simple reason that they did not know what these principles meant when they came to apply them. They have not the mind or vision to grasp the picture of the typical, the picture of the individual normal, and separate it from the hypothetical. I am delighted to have had the pleasure of hearing Dr. Johnson; I always have enjoyed him because he thinks.

**Dr. A. Hoffman**, Buffalo, N. Y. I wish to express my appreciation of Dr. Johnson's paper. It deals with a subject that is of much interest to the dental colleges and for a long time there has been an urgent call for something more definite as to what, in orthodontia, should be taught to the undergraduate. I have endeavored for a number of years to teach this subject and think the best results were obtained when every student was required to gain a passing mark in the general lecture and technical courses, leaving the practical work for those members of the class who displayed a special interest or ability along that line. I feel sure that the dental schools would be very glad indeed to cooperate with a committee from this society in the effort to formulate a suitable course in orthodontia for the undergraduate. Dean Turner has thus expressed himself and a close contact with the members of the American Institute of Dental Teachers brings me to that belief.

**Dr. J. Lowe Young**, New York City. *Mr. Chairman*, I have enjoyed Dr. Johnson's address this morning, and I think it would be certainly advisable to have a committee appointed in this society to



take up this question. The American Society authorized the appointing of a committee, and it was my duty to appoint it, and I put Dr. Johnson on it. I think it would be a good thing for this society to appoint such a committee. The two societies working together will do a great deal more good than one organization alone. Dr. Johnson's paper is too deep to be considered offhand and it requires much consideration. I think it would be only waste of time for me to try to discuss it. However, at this time I wish to repeat that I think we should appoint a committee to act in cooperation with the American Society.

**Dr. J. V. Mershon**, Philadelphia, Pa. *Mr. Chairman*, Dr. Young has said what I anticipated, therefore, I am going to make a suggestion followed by a motion. As long as the American Society has appointed a committee for the same purpose, and while I may be telling tales out of school, I will let you know that at this time there is an invitation from the American Society, which is to meet in Atlantic City next spring, that this organization meet with them, and it might be a very good plan to have this committee appointed, and I hope that we can have a joint meeting.

I therefore move that the President of this Society appoint a committee as large as he deems wise, for the Eastern Association to meet with a like committee of the American Society, to be present and report at the annual meeting in Atlantic City.

The motion was seconded and carried.

**Dr. Milo Hellman**, New York City. *Mr. Chairman*, I would like to say a few words in regard to Dr. Johnson's paper. Recently I have been trying to take up so many things that I have become somewhat bewildered myself. I do not like to confuse myself, and there are two questions I would like to have Dr. Johnson answer, and if he will be kind enough to do so now, I wish he would. Do I understand him correctly, in reference to his plan as outlined, that it is intended as a general course for the undergraduate?

**Dr. Johnson**. No, it is offered as a

foundation upon which to build a course for the undergraduate.

**Dr. Hellman**. I would like Dr. Johnson to repeat the allusion he has made with reference to anthropology and orthodontia.

**Dr. Johnson**. The reason I took that up was because I felt that in orthodontia so much emphasis has been laid upon the study of the correlations and harmonious developments and types that it has clouded the real issue, which is one of individual variation for the orthodontist. I have not distinguished the work of the anthropologist, which has been over-emphasized, I believe. In the course of orthodontia it should have its place but related in its importance with the other things.

**Dr. H. E. Kelsey**, Baltimore, Md. *Mr. Chairman*, I believe that our discussion has gotten away from the point a little bit. Nobody appreciates the findings of anthropology any more than I do, but we are working on a situation that has to do with the practical subject of determining what shall be taught in the preliminary education of orthodontists.

I had the pleasure of going over Dr. Johnson's paper at his home the other night, and an analysis of it, which he made for me, brought me to the conclusion that he was right on almost every point. I do not think we can now decide points that have not yet been settled. That is not our business at present, and it seems to me we should take some decisive action as to the benefit of a change in our standards of undergraduate education, and determine what those standards should be as soon as we can. This organization and the other organizations interested in the subject matter might help to outline something along the lines presented by Dr. Johnson. Dr. Johnson's paper, as I understand it, is a sort of an analysis of the whole subject and from it we can get suggestions for the compilation of courses that will be comprehensive and which would be almost a complete though necessary reversal of previous methods.

The meeting adjourned until 2 o'clock.

(To be continued.)

# THE DENTAL COSMOS

A MONTHLY RECORD OF DENTAL SCIENCE.

*Devoted to the Interests of the Profession.*

EDWARD C. KIRK, D.D.S., Sc.D., LL.D., *Editor.*

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PHILADELPHIA, OCTOBER 1920.

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## EDITORIAL DEPARTMENT

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### The Oral Hygiene Propaganda.

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IN our August issue we called attention to a new development in relation to the oral hygiene propaganda, whereby the importance of the hygienic mouth was being brought directly to the attention of the lay public through the medium of paid advertisements in the public press.

Heretofore the approach to the public ear has been more or less indirect through professional journals, desultory lectures to school, church and welfare audiences and, so far as the lay press is concerned, such articles as have dealt with the problem have been mainly written by news contributors with but a superficial and imperfect understanding of the subject matter. The dental profession has refrained from presenting its case squarely to public attention because any such course, which savored of personal advertising, is repugnant to the ethical sense of the profession, and would



therefore lack professional support and tend to defeat its own objective. But a broad and elemental distinction must be made between personal advertising and of advertising an enterprise in the interest not of the individual, but of the public weal. Propaganda by the medium of advertising, which is obviously free from the taint of individual interest and wholly concerned with the general welfare, is not only unobjectionable but beneficent in its purpose and desirable in its results. Advertising as a means for promoting selfish interests has always been under the ban of professional ethics and as advertising generally speaking, at least in its commercial phase, has been and is so commonly characterized by the motive of individual acquisitiveness and personal interest, it has come to be the commonly accepted understanding that advertising has no other meaning or purpose.

That the popular conception of advertising is only a partial and therefore erroneous connotation of the term is evident when considered from the standpoint of its general meaning. To advertise, in a broad sense, is to inform or give public notice and it is therefore essentially educational in its purpose. It is the underlying motive of advertising that determines its ethical or unethical character as the case may be.

In the case under consideration there can be no question as to the soundness of the plan on ethical grounds. A movement was originated by a group of New England dental practitioners of high professional standing and long experience in educational matters, who have undertaken to bring the gospel of oral hygiene to the general public directly through the medium of a series of well-written homilies upon the hygiene of the mouth and teeth, published as paid advertising matter in a selected group of daily newspapers. A responsible and experienced committee has undertaken to organize the movement as an intensive campaign extending over a period of ten weeks and to generalize it throughout the principal cities of the nation. The dental profession will be asked to share in the expense of the campaign as the necessary advertising space must be paid for at standard rates. The advertisements will be unsigned and impersonal, their whole purpose and object being to impress the mind of the lay public with the necessity for the care of and attention to the teeth as a general health measure, and they will emphasize the value of dental pro-



fessional service as a conservator of good health in such a way as to give to dentistry the position in the public estimation to which its intrinsic importance entitles it.

We feel that this movement should receive the material and moral support of the general dental profession, as it is the first legitimate effort ever undertaken by the dental profession to bring directly to the attention of the lay public in an ethical way trustworthy information upon the nature and value of the service which dentistry is equipped to render in the conservation of health.

As a means for commanding public attention, all experience has demonstrated that advertising in the public press stands preëminently in the first place. Editorials, short essays, educational articles all have their place and value, but the well-written advertisement catches the eye of the public at large and particularly of that numerous class to whom the perusal of a formal essay or educational screed is a burdensome impossibility. It is just that class that reads advertisements by preference and it is they also who generally speaking have greatest need of information on the oral hygiene question. Doubtless the proposed advertising campaign will meet with criticism and opposition, probably from the few who have not yet awakened to the fact that the old things are passing away and that the world is being remade.

One of the characteristic features of the new order is the spreading of the truth by education of the masses in all things that make for the betterment of human health, happiness and good living. This advertising campaign is a development of the new order and it will not fail of accomplishment of its object because of criticism or protest here and there due to the occasional outcropping of moss-grown prejudices, the senile survivals of a past era.

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## BIBLIOGRAPHICAL

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DIE KRONENSTRUKTUR DER UNTEREN PRAEMOLAREN UND MOLAREN. EIN BEITRAG ZU DER MORPHOLOGIE DES MENSCHLICHEN GEBISSES. Inaugural-Dissertation zur Erlangung der Würde einer Doktors der Zahnheilkunde der Medizinischen Fakultät der Universität Zuerich, vorgelegt von TH. E. DE JONGE COHEN, von Amsterdam, Assistant am Zahnärztlichen Institut der Reichs-Universität zu Utrecht. Druckerei J. Van Boekhoven, Utrecht, Holland, 1917.

(THE STRUCTURE OF THE LOWER PREMOLARS AND MOLARS. A CONTRIBUTION TO THE MORPHOLOGY OF THE HUMAN DENTURE. BY TH. E. DE JONGE COHEN, Amsterdam. Assistant at the Dental Institute of the State University at Utrecht.)

Cohen is a pupil of Professor L. Bolk, Director of the Anatomical Institute of the University of Amsterdam, Holland, and his conception of the morphology of the human teeth is based upon the well-known theories of his teacher. Cohen is convinced that Bolk's "Theory of the Terminal Reduction of the Enamel Ridges" is proved by his own investigations. He assumes that the lower premolar, having two cusps, should have six cusps according to the formula:  $\frac{1 P 2}{3 D 4}$

and the three-cusp type should have five cusps:  $\frac{1 P 2}{D 4}$ . The first type has three central and six peripheral sulci and the second type two central and five peripheral sulci. The six-cusp type shows a primary ridge reaching from P to D and two secondary ridges from 3 to 4. The primary ridge in the five-cusp type is divided into one branch reaching to D and over to 4. The mesial half of the first premolar resembles the canine type, while the distal half is closely resembling the premolar type. Molars are five-cusped teeth:  $\frac{Pa Pp 2}{D 4}$  and they are represented by three types.

(1) The mesio-buccal sulcus proceeds mesially of the lingual sulcus.

(2) The mesio-buccal sulcus proceeds as an extension of the lingual sulcus; and

(3) The mesio-buccal sulcus proceeds distally of the lingual sulcus.

The various problems are illustrated with excellent photographs and a number of plain line drawings. Cohen and Bolk explain these variations as progressive morphologic processes; other authors refer to them as retrogressive. Bolk's theory of the evolution of the teeth is a most valuable contribution to morphology; as yet it is not generally accepted by the leading anatomists.

H. P.

## PRACTICAL HINTS

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This Department specially welcomes the brief presentation by our readers of any novel suggestions or methods which in their own practice have proved to be time-saving or to possess other features of advantage.

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### A Method That Will Save Pulp of Teeth in Bridge Work.

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By N. J. GOODWIN, D.D.S., Hartford, Conn.

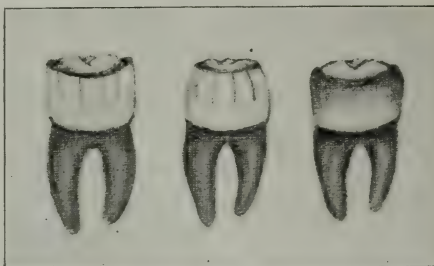
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WE are seeing so much of late in our magazines about the death of pulps resulting from the use of full gold caps and large inlays for attachments of bridges that it has made me feel it a duty to let my brother dentists know what I have been doing in this field for over twenty years and the results.

I began making bridge work some twenty-five years ago, and when using molars for support made the full gold shell as others did. After a short experience, however, I stopped cutting away the masticating surface of the tooth that I might retain Nature's occlusion, which seemed to me very desirable and its destruction not at all necessary. Then the only grinding was at the sides of the crown, so that the circumference would nowhere be greater than at the neck. I then made a band of plate gold, conforming it perfectly to the tooth at both edges; the gold at the neck of the tooth should not come in contact with the gum tissue. This is a common error which leads to trouble. It should be finished to a thin edge and burnished perfectly to the tooth surface when finally placed.

The bands may be made to fit near the masticating surface in a variety of ways.

My usual method is, after having formed the band and gotten the proper width, to slit it toward the neck, leaving many strips which can easily be forced into contact with the tooth near the occlusal surface. When that is accomplished, remove it and grind away the edges of



strips inside the band, then replace it, hold it firmly in place and force the ends of the strips perfectly into position. Now place investment compound on the strips inside the band so that no solder can flow through and interfere with the adaptation to the tooth surface. Next flow on a heavy body of solder, letting it extend to about the middle of the band. In finishing make the edge of the band thin so that it may be nicely burnished to the tooth surface. My experience is



that these bands properly made never give way. They are suitable for fixed or removable bridges.

My son also has been using this method for many years, and we are not aware that in a single case death of the pulp or any irritation even has resulted. We feel confident that it is the cutting away of the occlusal surface of the teeth to the extent that many do that leads to the death of the pulps; and that is what hundreds of others believe, who are destroying pulps before placing the gold shells.

We believe our experience proves there is no need of taking any risk of pulps dying or for their wholesale destruction for the sake of using the full gold shell on molars. If there are cavities in the occlusal surface, we fill them and use this method for bridge attachments just the same.

I think it desirable to cut lines on the side of the tooth horizontally with a thin disk and on the inside of the band with a sharp excavator before cementing the band in place.

783 MAIN ST.

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## **To Remove Modeling Composition from an Overheated Model.**

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**By C. W. RATCHEFF, D.D.S., Chicago, Ill.**

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WHEN the modeling composition has been overheated just prior to its removal from a model, a more or less uneven film is left upon the model with the fossæ and grooves completely filled up with the composition. Its removal with instruments is rather difficult and often leaves false impression and scratches.

An easy way to remove the compound is to dip a good-sized pellet of cotton into chloroform and by gentle rubbing the composition will be dissolved and washed off, leaving a clean model.

817 W. ADAMS ST.

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## **Quick Repair of a Vulcanite Denture.**

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**By S. H. SIEGEL, D.D.S., New Brunswick, N. J.**

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AN army captain presented with a partial vulcanite denture which would not stay in place on account of one of the clasps being broken off. I asked him to leave it for three hours, as it had to be repaired and revulcanized, but he remarked that he had to leave town in half an hour; and asked if I could rivet it on somehow temporarily.

After some thought I conceived a plan of repair which proved to be very satisfactory. The clasp was of the band variety and had broken away from the attaching lug, which was left in the vulcanite. I drilled two small holes through the clasp band, placed it on the denture and with an explorer marked the corresponding points in the vul-

canite, where I continued drilling about the distance of two teeth. (It was the position of the lateral and central incisors.) I put the broken clasp in place, took two spear-shaped, cross-cut straight burs, the size heavier than the spear-shaped bur used for drilling the holes, and supporting the denture on the anvil hammered them into the holes through clasp and into the vulcanite. I then broke off the burs, leaving about two-

thirds of their cutting portion in the denture. The steel of the burs being brittle, they broke flush with the gold of the clasp. I smoothed the broken ends off with a fine stone and it proved to be a very strong repair. I used cross-cut burs, as I thought the cuts and serrations of these burs would help to make the repair more firm and stable.

119 ALBANY ST.

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## **Sterilizing the Hypodermic Needle.**

By Dr. ISAAC HELLMAN, Bronx, N. Y.

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THE following simple and practical method for sterilizing the needle and anesthetic crucible may be of some interest to those using conduction anesthesia:

Place the needle in the novocain dissolver; fill the dissolver with distilled

water and bring the water to the boiling point. Keep the water at this temperature for several minutes. This sterilizes the needle and dissolver at the same time.

718 WESTCHESTER AVE.

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## **A Sectional Tray for Partial Impressions.**

By A. KASSAB, D.D.S., Chester, Pa.

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TAKE an impression of the parts with modeling compound, placed in an oiled metal tray in the usual way; chill and remove from the mouth. Remove the compound from the tray and enlarge its impression side, cutting out all undercuts, so that when the compound is returned to the mouth it will pass in and out very easily. Roughen the impression side well, so that when the plaster is applied it will adhere to it. Now on the side of the compound which was next to the tray, make a groove (from one end to the other) quite deep, then with

a knife split it in two, three or four sections as the case may demand. Put the fragments together and fasten them with beeswax. We now have a tray in sections which are fastened with wax and ready for the plaster. Mix the plaster thin, apply to the tray, and place in the mouth. When hard, the wax fastening the sections is scraped off and a knife is placed in the grooves and the sections pried apart. The impression usually comes off in as many sections as there are in the tray.

# REVIEW OF CURRENT DENTAL LITERATURE

[*Lancet*, London, May 22, 1920.]

## Review of Recent Work on Chronic Arthritis. BY G. L. K. PRINGLE.

The author approves and concludes by quoting the work of Nathan (*American Journal of Medical Sciences*, 1916 and 1917): "No, it is not unlikely that a focus in a tooth is sometimes, and one in the tonsil is often, the point of entry for bacteria; it should be remembered that once the microorganism has entered the blood its connection with the portal of entry ceases. For this reason, though the removal of the affected teeth or tonsil will, if these are really the site of the original focus (which is not by any means always certain even when they are abnormal), prevent reinfection or recurrences, such proceedings have absolutely no influence upon the joint condition as it already exists."

[*Deutsche Medizinische Wochenschrift*,  
May 6, 1920.]

## Diagnosis of Dental Neuralgias. BY H. KRON.

Author unable to find hyperesthetic zones (Head) in trigeminal neuralgias, but rather some areas similar to the "maximal points." Aural and temporal pain should direct attention to mandibular first and second molars: temporal alone, to left mandibular second molar. In a number of details Kron differs from Head.

About half this paper is given over to psychogenic dental neuralgia. Two cases are briefly described.

[*Archives of Dermatology and Syphilology*,  
Chicago, July 1920. Vol. 2, No. 1.]

## A Melanotic Tumor of the Lower Lip Treated with Radium. BY D. W. MONTGOMERY AND G. D. CULVER.

Case, male of thirty-seven years; particularly interesting because radium or roentgen-rays are generally contra-indicated in mela-

notic tumors. (Identity of this one never established.) Details of lesion, its history, and of treatment (dosage and frequency) given in original.

[*Proceedings Royal Society of Medicine*, London, Section on Odontology, May 1920.]

## Hemihyperplasia of Face, Jaws, and Teeth. BY M. F. HOPSON.

1. Patient, male, age seventeen years. Right side affected. Soft parts, including right half of tongue, involved, as also frontal bone. Teeth of right side much larger than those on left.

2. Patient, male, age seven and a half years. Left side of face affected; noticed at birth. Precocious eruption of left permanent teeth. Other features in general correspond closely to case No. 1.

[*Münchener Medizinische Wochenschrift*,  
June 18, 1920.]

## Ultero-membranous Stomatitis and Its Treatment with Salvarsan. BY CÉSAR HIRSCH.

Intravenous injections of neosalvarsan (0.45 to 0.75, never more than four injections needed) proved successful in cases (negative to Wassermann) which did not yield to the local application of the drug.

[*Lancet*, London, July 17, 1920, Vol. 199,  
p. 127, No. 5055.]

## Infection with the Organisms of Vincent's Angina Following Man Bite. BY P. H. HENNESSY AND WM. FLETCHER.

There can be no doubt from the details of the case but that this was a genuine Vincent's infection of the thumb, which had been severely mangled. Amputation was necessary. The interest lies in the possibility of infection to dental operators from chisel wounds, etc.



[*Journal American Medical Association*,  
August 14, 1920.]

**The Rôle of Deep Alcohol Injections in the Treatment of Trigeminal Neuralgia.**  
BY HARVEY CUSHING.

The alcoholic injections have been a great boon to innumerable cases of minor neuralgia; and in certain cases of major neuralgia of obscure and uncertain type they are of value as a means of certifying the nature of the neuralgia by the brief period of relief which may ensue. Certainly in the major neuralgias true to type it is procrastination to use them, and when carried to the point of injecting the ganglion itself, the recorded complications are so much worse than any complications which one sees at present after a Gasserian operation (avulsion of the sensory root) that there can be no matter of choice. The mortality of the avulsion operation is negligible. In the author's series there have been to date of writing 312 consecutive cases without fatality.

Perret (*Schweizerische Medizinische Wochenschrift*, June 17, 1920, per *Journal of American Medical Assn.*, vol. 75, p. 509) describes a successful case, treated by a similar method (section of sensory root).

On the other hand, Pichler (*Wiener Klinische Wochenschrift*, 1920, Nos. 21 and 22, Bd. 33; per *Journal of American Medical Assn.*, vol. 75, p. 514) reports that alcoholic injections in the Gasserian ganglion can be relied on to cure trigeminal neuralgia in almost every instance.

[*Deutsche Medizinische Wochenschrift*,  
May 6, 1920.]

**The Permanency of Intracranial Injections in Trigeminal Neuralgia.** BY FRITZ HÄRTEL.

Report on thirty-seven cases of alcoholic injection of Gasserian ganglion through foramen ovale; favorable to this method. The conclusions are that (1) in this way permanent and complete relief from pain may be secured (one case without return for seven and a half years); (2) hysterical and "boundary" cases should not be so treated; (3) it is technically possible to save the first branch of the fifth nerve from permanent anesthetization; and in mild cases this is advisable to safeguard against a keratitis; (4) prelim-

inary roentgen-examination will increase the ease and certainty of inserting the needle in the foramen ovale.

[*Proceedings of Royal Society of Medicine*,  
London, Section of Odontology, May 1920,  
Vol. XIII, No. 7.]

**Chronic Infective Osteitis of Maxillæ.** BY H. W. TURNER.

Patient, male, age forty years. Condition of twelve years' duration, an enlargement of the alveolar region of both maxillæ. Periodontal infection existed. All teeth removed. Considerable improvement in six months, when as much of the growth as possible was removed. Antra had been obliterated. Histologically the growth appeared to be an inflammatory hyperplasia. No bacteria could be demonstrated.

[*Dental Record*, London, August 1920.]

**Subinfection and Latent Infection.** BY J. G. ADAMI.

Adami emphasizes two phases of focal infection which are not always recognized. The conditions Goadby has found in healed war wounds belong to the class of latent infections. A wound may be apparently completely healed for months and then become the seat of renewed acute inflammation, or upon opening an old wound that has been healed for months, despite the most thorough asepsis, the tissues that have been cut into become the site of acute inflammation. In latent infection we deal with a late resultant of previous acute infection due to the persistence within the tissue in a latent state of certain bacteria which had set up that earlier, acute infection. In latent infection the tissues and the bacteria are in an indefinite state of equilibrium.

By subinfection is meant something quite different. The tissues are only potentially and not essentially sterile. Bacteria are constantly throughout life passing into the lymph and bloodvessels, to be carried to distant parts, there normally to be destroyed. This destruction liberates bacterial proteins and endotoxins, which are capable of locally setting up degenerative and necrotic processes, with consequent fibrosis. There is no multiplication of the bacteria in the tissues.

The application of these conceptions of latent and of subinfection to oral infection

are obvious. A long-standing quiescent periapical infection may suddenly, following fatigue, cold, or more obscure stimuli, or upon opening the canal for treatment, develop into an acute exacerbation. This illustrates latent infection.

On the other hand, from such a quiescent latent focus, or from an acute periapical or pyorrhetic process, unusual number of bacteria gain access to the lymph and blood stream and their subsequent destruction, even though the body be strong enough to prevent their multiplication or to prevent manifest symptoms, will entail more numerous and more extensive focal degenerations and necroses throughout the tissues, with proportionate impairment of function.

**The Amœbæ Living in Man.** By CLIFFORD DOBELL. (Wm. Wood & Co., New York City, 1919.)

This monograph, dated April 1919, contains the best summary of our knowledge of *ent-amœba gingivalis*, Gros, 1849. The author concludes that at present there seems to be no good evidence to support the hypotheses that this microorganism attacks the tissues, that it is the cause of pyorrhea, or that it is in any way pathogenic. Further, the claims of the specificity of emetin have never been substantiated. This drug probably is not a general amœbicide, although on this principle it was introduced into dentistry.

Dobell recognizes six species of amœbæ parasitic in man, only one of which (*E. histolytica*) is of demonstrated pathogenicity (amœbic dysentery). Administration of emetin will cause the disappearance of *E. histolytica* and of *iodamœba bütschlii* (pp. 120-1) from the stools; but this drug is inefficacious in infection with *E. coli* (p. 91), *E. gingivalis* (p. 100), *Endolimax nana* (p. 109), or *Dientamœba fragilis* (p. 124). Its action is primarily upon the host and not upon the parasite (Dale and Dobell, 1917. *Journal of Pharmacology and Experimental Therapeutics*, x, 399.) In support of this may be cited the fact that emetin is ineffective in *E. histolytica* infection in the dog or cat (p. 130).

It may be of interest to note that in the treatment of amœbic dysentery, emetin hydrochlorid has been supplanted by emetin-bis-

muth iodid, which form of the drug should be tried by those who still consider *E. gingivalis* a factor in pyorrhea alveolaris.

[*British Medical Journal*, May 29, 1920.]

**A Case of Facial Trophoneurosis.** By I. H. LLOYD.

A brief note with one unsatisfactory illustration. Boy of seventeen years affected with progressive facial hemiatrophy involving all bones of right side of skull and all muscles of right side of face.

[*Archives of Neurology and Psychiatry*, Chicago, August 1920.]

**Significance of Facial Pain in Determining the Location of Intracranial Tumor.** By WILLIAMS B. CADWALADER.

Pain and anesthesia of the face preceding deafness possess a significance not always appreciated. These symptoms are usually caused by a tumor involving the Gasserian ganglion. The report of a single case is given in detail, in which facial pain followed by anesthesia, or anesthesia dolorosa, in the fifth nerve distribution was the most striking clinical symptom. The motor branch was also affected, for the temporal and masseter muscles on the affected side (left) were distinctly weaker than the muscles of the opposite side. Necropsy showed a chondroma completely embracing the root of the fifth nerve and also extending into the antrum.

[*British Medical Journal*, May 22, 1920.]

**Chronic Paroxysmal Trigeminal Neuralgia and Its Treatment.** By WILFRED HARRIS.

The author attributes this condition to peripheral stimulation of afferent nerves. To him it seems highly probable that these stimuli are due to septic neuritis of dental nerve filaments, the result of previous dental caries, pyorrhea or periapical infection. Harris reports a pure culture of streptococci from aseptically removed tissue. Records of 312 cases (including twenty-five bilateral cases), extending over twelve years, are analyzed.

This report is favorable to treatment by alcoholic injection into Gasserian ganglion through foramen ovale (employed in sixty-three cases in the past ten years).



# OBITUARY

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## Dr. Albert H. Stevenson.

[SEE FRONTISPIECE.]

DIED, at the Norwegian Hospital, Brooklyn, N. Y., July 29, 1920, of spinal meningitis, in his thirty-seventh year. ALBERT HENRY STEVENSON, D.D.S.

Dr. Stevenson was born in Brooklyn, N. Y., March 22, 1884, the son of Henry Burns Stevenson, a diamond broker. He received his early education in the public schools of Brooklyn, and in 1903<sup>9</sup> entered the New York College of Dentistry, from which institution he received the D.D.S. degree in 1906. Immediately after his graduation he established himself in practice in Brooklyn and was in active practice at the time of his death.

Soon after beginning practice, Dr. Stevenson affiliated himself with the Second District Dental Society of New York and was soon actively interested in public health education, particularly oral hygiene, becoming a member of the Oral Hygiene Committee and the following year Chairman. In 1918 Dr. Stevenson became Assistant Director of Extension Teaching in the Courses of Oral Hygiene, Columbia University, and the following year was put in charge of the Advanced Courses in Dentistry, Columbia University. He was appointed Professor of Preventive Dentistry in 1919.

Dr. Stevenson's enthusiastic interest in public health education soon placed him in the forefront of the Oral Hygiene propaganda and impelled him to give much of his time to lecturing in public schools, before mothers' clubs, and in settlement houses. He was also active in the public health work in New York City of the American Red Cross and of the New York Association for Improving the Condition of the Poor.

In addition to his local activities in the interests of public health, he was in demand

nationally as a lecturer on this subject, appearing before numerous organizations in the United States, and was instrumental in the passage of the law legalizing the dental hygienist in the State of New York and in other States.

Dr. Stevenson was stricken down almost at the beginning of a most auspicious career as an educator. His standards of education were idealistic, and his sincerity of purpose in the pursuit of those ideals was making his influence strongly felt in this field. His many friends who were watching his career with pride and interest were greatly shocked and saddened by his untimely death. He was an indefatigable worker with a delightfully attractive personality which immediately won him friends wherever he went. A man of strong convictions and with a courageousness of purpose which won the admiration of even those who disagreed with him.

Dr. Stevenson was a member of the Second District Dental Society of the State of New York, serving as its President in 1914; a member of the New York State Dental Society; the National Dental Association, acting as delegate to this Association from New York State in 1919-20; a member of the New York Dental Research Club, and a member of the Delta Sigma Delta Dental Fraternity.

Dr. Stevenson was married in June 1913 to Miss Ellen Sampson Olena of Brooklyn, who, with two small children, survives him.

"He had the soul of truth,  
Strong with the strength of youth;  
He had the gift of wit,  
With love to sweeten it.

"He knew not fear or shame;  
When the destroyer came,  
When death betrayed the fall,  
He could surrender all."

—STODDARD.



## *SPECIAL NOTICES.*

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### **Dental Survey of New York City.**

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**Conducted by the New York County Chapter American Red Cross,  
119 West 40th Street, New York City.**

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A DENTAL survey which Dr. Alfred H. Stevenson, Professor of Preventive Dentistry at Columbia University, declared is the first of its kind ever made in New York City, is being undertaken by the Health Service Department of the New York County Chapter American Red Cross. All the free dental clinics for children in the city are being asked to coöperate in getting together complete and authoritative statistics on the extent and character of the dental needs among the children.

A letter has been sent by the Red Cross to each of the forty-seven dental clinics on Manhattan Island, asking their coöperation and requesting them to add to their card indexes of cases a type of record card which has been prepared by the Department in consultation with the Association for Improving the Condition of the Poor and the leading dental authorities in the city. The card suggested is of the simplest character and is designed to make a record of examinations only. Its chief merit in the eyes of the department is that it will be uniform for all forty-seven agencies.

On the basis of returns for twelve months, the department plans to make a report, showing the scope and kinds of the need for dental work among the children in New York City, and any need that may exist for increased facilities.

This survey is but one of many services in the interest of public health which the Health Service Department is undertaking, or plans to undertake in the near future.

An intensive study of nutritional activities in New York County is being conducted by Mrs. Laurette H. Muns, an expert in this type of investigation, with the idea of assisting the many agencies, schools, settlements, and the like, which are aroused to the necessity of scientific nutritional work among children,

but which do not know exactly how to go about meeting the need.

A map showing the health facilities of Manhattan is another service undertaken by the department. This map indicates the location of hospitals, dispensaries, clinics, maternity centers, baby health stations, settlements, and neighborhood associations which maintain health activities, nursing associations and health centers. It has been reduced to handy office size and is being distributed to the numerous public health agencies in New York City for their information and ready reference.

To aid and interpret the work of existing public health agencies in New York City in every way possible is the aim of the Health Service Department, which has been in existence only since January. It was instituted at that time as a major peace time activity by the New York County Chapter of the Red Cross, on the recommendation of a special committee consisting of Dr. James Alexander Miller, President New York Tuberculosis Association; Dr. Hermann M. Biggs, State Commissioner of Health; Bailey B. Burritt, General Director Association for Improving the Condition of the Poor; Dr. Haven Emerson, former New York City Health Commissioner; Homer Folks, Executive Officer New York County Chapter American Red Cross; John M. Glenn, Director General Russell Sage Foundation; Dr. L. Emmett Holt, Chairman Child Health Organization; Dr. Thomas W. Salmon, General Director National Committee on National Hygiene; Dr. William F. Snow, General Director American Social Hygiene Association, and Dr. Philip Van Ingen, President American Child Hygiene Association.

How the department develops its program of aiding and interpreting the work of existing health agencies in New York City, should prove one of the most interesting studies in the field of public health.

## Vienna Physicians and Dentists Destitute.

VIENNA is today battling for its very existence. The gay crowds of well-dressed people and elegant equipages which once thronged the magnificent Ring and the lovely Prater have long since vanished. The fine trees of the Wiener Wald have become victims of the woodchopper.

A recent dispatch to the *Musical Courier* says: "Vienna is the saddest city in the world. If one is soft-hearted, it is difficult to repress the tears as one wanders through its once brilliant streets. While one stops to greet a friend, three beggars or more appeal to one's charity. And such beggars—ragged and haggard, emaciated yellow creatures that once knew joy. As one rides through the streets poor mothers with thin, paper-skinned babies look at one from the curb. Hands stretch out from everywhere."

A prominent New York banker, recently returned, says: "All that class (professional people) are left with absolutely nothing. All the time I was in Vienna I couldn't help feeling that I was living in a morgue. Beautiful streets, a beautiful opera house and the city beautifully kept, but nothing doing."

Viennese dentists are in desperate straits. They must continue to do their part in relieving the many ills of an undernourished population, but they cannot feed their children with the scanty Government ration, even when supplemented by their pitifully meager incomes.

The American Relief Committee for Sufferers in Austria, 261 Madison ave., New York, of which Hon. Frederic Courtland Penfield, late American Ambassador to Austria-Hungary is honorary chairman, has created a special fund for the relief of destitute Viennese physicians and dentists.

Contributions may be made to Alvin W. Krech, President, Equitable Trust Company, 37 Wall st., New York City, treasurer of the committee.

## DENTAL COLLEGE COMMENCEMENTS

### New York College of Dentistry.

THE fifty-fourth annual commencement exercises of New York College of Dentistry were held in Aeolian Concert Hall, New York, N. Y., on June 15, 1920.

An address to the graduates was delivered by Rev. George R. Vandewater, D.D. The degree of Doctor of Dental Surgery was conferred on the following graduates:

Leon Axelrod  
Isidore Bernstein  
Jos. A. Boiko  
Nathan T. Brussel  
Jos. F. Buckley  
Sampson A. Cohen  
Louis Cohen  
Harry Deutsch  
George B. Elder  
Jacob Feinbloom  
Max Feinman  
Louis Fried  
Max Goldschlag

John F. Hanold  
Vernon Hogarth  
Samuel Hornick  
Hannes Hoving  
Harry L. Jones  
Louis H. Katz  
Abraham Kaufman  
Max Kawesch  
Andrew King  
Lambert Klopman  
John J. Koehler, Jr.  
Abraham Kuttler  
Hyman Lehrer

Philip Lettes  
Samuel Lobel  
Arthur London  
Henry C. Long  
Frederick R. Lopez  
Israel Meranus  
John J. Most  
Otto Napelbaum  
Max Nimkoff  
Harry Parker  
Hyman Pines  
Samuel Pines  
Samuel Radeloff

Walter A. Rath  
Willett G. Rendell, Jr.  
Joseph Roig  
Milton Scheininger  
Solomon Seligman  
Samuel G. Shapiro  
Abraham Siegelman  
Louis B. Sokol  
Charles H. Stimpson  
Jacob Weissman  
Louis Zingman  
Joseph W. Zuckerman

### University of Buffalo, College of Dentistry.

AT the annual commencement exercises of the College of Dentistry of the University of Buffalo, held in Buffalo, N. Y., the degree of Doctor of Dental Surgery was conferred on the following graduates:

Philip Bender, Jr. ....	New York	Sarsfield J. O'Connor .....	New York
Francis E. Dowd .....	New York	Cornelius E. Reardon .....	New York
Charles C. Freeney .....	Iowa	Nelson C. Ross .....	New York
Louis C. Guarino .....	New York	Benedict F. Sapienza .....	Alabama
James L. O'Connor .....	New York	Ralph R. Tillapaugh .....	New York

### Colorado College of Dental Surgery.

AT the annual commencement exercises of Colorado College of Dental Surgery, held in Denver, Colo., the degree of Doctor of Dental Surgery was conferred on the following graduates:

Ronald D. Benjamin	Byron J. Burton	John S. Miller	Glenn G. Stoddard
Wm. A. Brennan	Phillip A. Callahan	Bernard E. Moore	Elmer E. Thompson
Emery W. Burley	Charles G. Grover	Wm. J. St. Peters	

The following dental nurses were graduated:

Ada Lucile Atherton

Madge I. Miller

### State University of Iowa, College of Dentistry.

AT the annual commencement exercises of the College of Dentistry of the State University of Iowa, held in Iowa City, the degree of Doctor of Dental Surgery was conferred on the following graduates:

L. G. Geiger .....	Iowa	Ewart C. Howe .....	Iowa
Clyde C. Grant .....	South Dakota	Harold D. Plotts .....	Iowa
Edwin W. Harper .....	South Dakota	Paul H. Shreves .....	Iowa
Ray A. Harvey .....	Iowa		

### Ohio State University, College of Dentistry.

AT the annual commencement exercises of the College of Dentistry of Ohio State University, held in Columbus, Ohio, on June 15, 1920, the degree of Doctor of Dental Surgery was conferred on the following graduates:

Harold L. Aylsworth .....	Ohio	Richard V. Nelson .....	Ohio
Frederick T. Baumgartner .....	Ohio	Radford P. Potter .....	Ohio
Leroy F. Cade .....	Ohio	Gale F. Powell .....	Ohio
Norman C. Colebrook .....	Ohio	E. Roy Rock .....	Ohio
Earl J. Denser .....	Ohio	Maurice Seiple .....	Ohio
Dwight L. Derr .....	Ohio	Ernest L. Shipp .....	Ohio
Harold D. Follansbee .....	Ohio	Ralph Shriber .....	Ohio
Jacob A. Freedman .....	Ohio	Herbert Wallace .....	Ohio
Frederick D. Hamilton .....	Ohio	Sam. Wallman .....	Russia
Vaneil G. Hunter .....	Ohio	Howard L. Warner .....	Ohio
Wm. R. Kampfer .....	Ohio	J. Campbell Watts .....	West Virginia
Edward C. Knoll .....	Ohio	George F. Way .....	Ohio
Vernon C. Maurer .....	Ohio	Homer B. Wellman .....	Ohio
Gailord Miller .....	Michigan	Elbert B. Williams .....	Ohio



### Baylor University, College of Dentistry.

At the annual commencement exercises of the College of Dentistry of Baylor University, held in Dallas, Texas, on June 16, 1920, the degree of Doctor of Dental Surgery was conferred on the following graduates:

Emmett R. Clements .....	Texas	Baily A. Phillips .....	Arizona
Rupert M. Coker .....	Texas	Phil F. Rosenstein .....	Texas
Harry J. Horwitz .....	Texas	James H. Watkins .....	Oklahoma
Carl B. McKinney .....	Texas	Clyde W. Yetter .....	Texas
Harley L. Patterson .....	Missouri		

### Meharry Dental College.

At the annual commencement exercises of Meharry Dental College, held on May 19, 1920, in Nashville, Tenn., the degree of Doctor of Dental Surgery was conferred on the following graduates:

R. C. Alexander	W. N. Edmonson	D. K. Jenkins	T. H. Robinson
F. E. Anthony	P. A. Erwin	K. M. Johnson	E. A. Roett
B. H. Atkinson	N. S. Evans	T. M. Johnson	J. K. Ryan
James Avery	M. P. Gilmer	R. F. D. Love	J. H. W. Sims
McCauley Bolton	J. E. Gipson	C. A. Lythcott	A. A. Staples
C. E. Bomar	G. M. Gonsalves	T. M. Mitchell	R. L. Stinnett
J. L. Cashin	A. W. Goodwin	J. A. Moore	L. I. Strickland
R. B. Compton	P. A. Goodloe	V. H. Palmer	R. B. Taylor
Mark Daniels	Henry Goss	S. J. Perrino	Geo. F. Waters
D. B. Donatto	R. N. Green	C. A. J. Phillips	R. E. Watkins
W. J. Dowdell	G. L. Haynes	Lloyd G. Phillips	J. C. White
C. M. Dreher	L. A. Haywood	S. F. Riley	E. A. Young
J. N. Dunston	C. O. Henry	J. B. Robinson	J. O. Young
Eldridge Dysart	L. R. Hill		

### University of Pittsburgh, Dental School.

At the commencement exercises of the Dental School of the University of Pittsburgh, held in Pittsburgh, on December 5, 1919, the degree of Doctor of Dental Surgery (as of the class of 1919) was conferred on the following graduates:

Ben Amdur .....	Pennsylvania	Ralph M. Miller .....	Pennsylvania
George J. Brett .....	Pennsylvania	James M. Morgan .....	Pennsylvania
George F. Hantz, Jr. ....	Pennsylvania	Morris Rubin .....	Pennsylvania
Frederick Highberger .....	Pennsylvania	Maurice Schmerer .....	Pennsylvania
Fred G. Jones .....	Pennsylvania	Howard M. Schwartz .....	Pennsylvania
Frank W. Kelly .....	Pennsylvania	William H. Silvis .....	Pennsylvania
Gideon S. Lacock .....	Pennsylvania	Lyman W. Spencer .....	Pennsylvania

At the commencement exercises held in June 1920, the degree of Doctor of Dental Surgery was conferred on the following graduates:

Herman H. Bauman .....	Ohio	Samuel L. Ostrosky .....	Pennsylvania
Louis Firestone .....	Pennsylvania	Isadore R. Pearlman .....	Pennsylvania
Victor C. Foltz .....	Pennsylvania	Edwin A. Pfeifer .....	Pennsylvania
Samuel A. Grinberg .....	Pennsylvania	Lawrence P. Ryan .....	New York
Abram Hytowitz .....	Pennsylvania	Harold C. Seaman .....	Pennsylvania
Alvin R. Kneeder .....	Pennsylvania	Henry Sloan .....	Pennsylvania
William R. Latimer .....	Pennsylvania	William F. Swanson .....	Pennsylvania
Charles T. Lowe .....	Ohio	John L. Watson .....	West Virginia
Francis C. Madden .....	Canada	Gordon M. Williams .....	Pennsylvania
Edmund B. Nagle .....	Canada	Ross B. Withrow .....	Pennsylvania

# SOCIETY NOTES AND ANNOUNCEMENTS

NOTICES should reach the Office of the DENTAL COSMOS *not later* than the 11th or 12th of the month preceding that of publication.

## Dental Hygienists' Association of Columbia University.

THE annual meeting of the Dental Hygienists' Association of Columbia University was held on Tuesday evening, May 4, 1920, in the Engineers Building, Columbia University. The following officers were elected:

*President*,—Rosalind T. Paradise.

*Vice-President*,—Violette St. C. Durant.

*Recording Sec'y*,—Pauline Maddenburg.

*Corresponding Sec'y*,—Frieda Baum.

*Treasurer*,—Estelle Lee.

*Executive Committee*,—Mildred F. Stahl, Frances V. Weisman.

Meetings for the year 1919-1920 were as follows:

October 7, 1919,—Business Meeting.

November 12, 1919,—Dr. Margaret Donohoe, gave a talk on important points of recent interest in oral prophylaxis.

December 9, 1919,—Dr. Leuman M. Waugh gave a lecture on "The Gingival Border and the Cemento-enamel Junction."

January 10, 1920,—First Annual Dance at the Hotel Ansonia, New York City.

February 10, 1920,—Dr. Elmer S. Best of Minneapolis, Minn., gave an interesting talk. Discussions by Doctors Albert H. Stevenson, Paul R. Stillman, and Wilbur M. Dailey.

March 2, 1920,—Dr. Ira S. Wile gave a most interesting talk on nutrition.

April 6, 1920,—Dr. Thaddeus P. Hyatt gave a talk, and papers were read by the Misses Estelle Lee, Etta Bernikow, and Rosalind Paradise.

An informal reception to the graduates of the 1920 Class of the Courses in Oral Hygiene, Columbia University, was given by The Dental Hygienists' Association of Columbia University in the Conference Room of Stu-

dents' Hall, Barnard College, on Wednesday evening, May 28, 1920.

Meetings of the Association are held regularly on the first Tuesday of each month, from October to May, in Students' Hall, Barnard College, Columbia University.

All hygienists and other interested people in or near New York City are urged to communicate with the secretary, and earnestly invited to attend meetings.

FRIEDA BAUM, *Sec'y*,  
1823 Broadway, New York City.

## National Anesthesia Research Committee.

THE annual convention of the National Anesthesia Research Committee will be held in Pittsburgh, Pa., the week of October 4th, in conjunction with that of the Interstate Anesthetists' Association and the Pennsylvania Medical Society. Prizes aggregating \$200 are offered by the society for the best papers on original research in anesthesia, such papers to be read at the annual meeting. This offer is open to all surgical, medical, and dental students and practitioners in the United States.

F. H. McMECHAN, M.D., *Chairman*,  
Avon Lake, Ohio.

## University of Iowa, College of Dentistry.

THE University of Iowa, College of Dentistry and Dental Alumni Clinic will be held at the dental building, Iowa City, Iowa, November 12, 1920.

JOHN VOSS, *President*,  
Dental Alumni Assoc.  
Iowa City, Iowa.

### Susquehanna Dental Association of Pennsylvania.

THE fifty-seventh annual meeting of the Susquehanna Dental Association will be held at the Hotel Sterling, Wilkes-Barre, Pa., October 26, 27, and 28, 1920.

FULLER L. DAVENPORT, *Ch'mn Ex. Committee*,  
520 Miners Bank Bldg., Wilkes-Barre, Pa.

GEORGE C. KNOX, *Recording Sec'y*,  
Middletown, N. Y.

### Maryland Board of Examiners.

THE Maryland Board of Dental Examiners will meet for examination of candidates for certificates on November 10, 11, and 12, 1920, in Baltimore at the Baltimore College of Dental Surgery at 9 A.M.

For application blanks and further information apply to

F. F. DREW, *Sec'y*,  
701 N. Howard st., Baltimore, Md.

### Illinois Department of Registration and Education.

THE Department of Registration and Education will hold an examination for dentists in Chicago the week commencing Monday, November 15, 1920.

The written work will be held in the city hall, beginning 8.30 o'clock Monday morning. The practical work will be held at the University of Illinois, College of Dentistry, 1838 West Harrison st.

Application, properly filled out, together with high school credentials and examination fee of \$20, must be on file in this office not later than November 5th.

Attention is called to the requirements regarding the photograph and dental diploma, which must be presented on the first day of the written examination.

F. C. DODDS, *Supt. of Registration*,  
Springfield, Ill.

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## UNITED STATES PATENTS

### PERTAINING TO OR APPLICABLE TO DENTISTRY

ISSUED DURING AUGUST 1920.

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#### August 3.

- No. 1,348,257, to LOUIS P. WAGNER. Combination inlay and orthodontia clamp.  
No. 133,777, to THE PENSLAR COMPANY. Trade-mark for dentifrices.  
No. 133,786, to HARRY R. RADIN. Trade-mark for containers and sterilizers for toothbrushes, usually made tubular and equipped with an end closure.

#### August 10.

- No. 1,349,013, to WILLIAM H. STANLEY. Coloring and parting material for dental impressions.  
No. 1,349,102, to ANDERSON C. S. ROBINSON. Dental ornament.  
No. 1,349,110, to WILLIAM O. SNYDER. Toothbrush and paste-case.  
No. 1,349,188, to G. F. DuBUQUE. Dental appliance.  
No. 1,349,464, to LANCIT and ZARGER. Dental instrument.

#### August 17.

- No. 1,349,592, to WILLIAM G. TURNER. Tooth filling.  
No. 1,349,767, to JAMES W. IVORY. Rubber-dam clamp. Forceps.  
No. 1,349,832, to ROBERT E. GRAVES. Dental handpiece.  
No. 1,350,002, to GILDEROY O. BURLEW. Dental separating or grinding disk.

#### August 24.

- No. 1,350,951, to HANS ARTMAIER. Dental instrument grinding device.

#### August 31.

- No. 1,351,108, to THOMAS F. LITTLEJOHN. Dental impression tray.  
No. 1,351,159, to CAVILEER and CAVILEER. Rotary toothbrush.  
No. 1,351,584, to CHARLES A. PALMER. Dental mold-cup.  
No. 1,351,623, to CLAUDE A. CONOVER. Detachable tooth.







DR. W. J. YOUNGER.

# THE DENTAL COSMOS

VOL. LXII.

NOVEMBER 1920.

No. 11

## ORIGINAL COMMUNICATIONS

### Orthodontia—The Ribbon-Arch Mechanism and Some New Auxiliary Instruments.

By EDWARD H. ANGLE, D.D.S., M.D., Sc.D., Pasadena, Calif.

(Read at the annual meeting of the Alumni Society of the Angle School of Orthodontia,  
Pasadena, Calif., August 7, 1917.)

(Continued from page 1176.)

#### A NEW METHOD OF FITTING BANDS.

I have devoted much time to experimenting in fitting both plain and clamp bands to molar teeth and I now wish to offer for your consideration a method for adjusting and fitting the clamp band which I have worked out within the past year and which insures the most perfect adaptation of the band to the enamel not only at the swell of the crown, but equally at the gingival margin, thus closely conforming to the physiological requirements of all the tissues, as well as affording the greatest firmness of attachment. Also a different protective medium than cement is employed—one that is more agreeable to the tissues than cement.

By this method the operation may be best performed by following certain

logical steps, thus conserving the time of both patient and orthodontist by eliminating superfluous movements. By "logical steps" I mean the necessary steps in the operation arranged in their most natural order. If you will memorize them you will soon follow them unconsciously, and learn to perform the operation easily and quickly, and I am sure you will be pleased with the results. In our clinic this afternoon I expect each of you to adjust a number of bands in accordance with this method, for it is highly important that you and all who employ it should first do the operation on teeth outside of the mouth, that you may learn the steps, as well as the necessary degree to which the nuts must be tightened in order to gain perfect adaptation.

Fig. 20 illustrates all the different



steps that readily admit of illustration in the adjustment of the band by this method. Each is important. First, a band of correct size is selected, Step 1. Step 2, the nut is turned well back and the band distended to approximately the size of the crown of the tooth on which it is to be placed. This is estimated by the eye. Step 3, the shaft of the screw midway of its length is slightly curved to conform it to the lingual convexity of the tooth. Step 4, the band is roughly squared to conform it to the general shape of the crown by three quick though gentle pinches of the band material proper between the flat beaks of pliers. I prefer for the purpose my first form of band-forming pliers, though any broad, smooth, flat pliers will answer.

by means of the fingers. Great care must be taken to keep the buccal portion of the band well down upon the crown and the lingual portion at its proper height, so that when the fitting is completed the screw will be well above the gingiva. The nut is now further tightened and the band again carefully inspected to see that its position has not been changed.

The occlusal margin of the band *only* is now slightly burnished to better adaptation to the enamel, care especially being given at this time to remove any sharp bends or buckling in this margin so that the metal, upon further tightening of the nut, will flow evenly. *The gingival portion of the band should never be burnished*, as this is not only

FIG. 20.



Step 5, a sharp inward bend is given to the two occlusal corners of the band material. Step 6, an inward bend is given to both mesial and distal occlusal margins. These last four bends are necessary to prevent the band from sliding apically while the nut is tightened. Step 7, the band is turned over and a *very narrow* portion of its gingival margin, say a portion one thirty-second of an inch in width, is slightly curved inwardly. This should be done with contouring pliers that have very smooth beaks so that they will leave no roughened places or crimps at any point on the margin. Step 8, the band is turned back again and gently and carefully worked into the desired position on the tooth, the end of the shaft of the screw being brought into the closest contact with the tooth adjoining and the nut not touching the gum. The wrench is now applied and the nut tightened until the band is moderately firm, yet loose enough so that if slightly misplaced during the tightening it may be readjusted

wholly unnecessary, but the burnisher cannot be effectively applied to this margin and the attempt would only injure the gum, something always to be carefully avoided.

Here a few taps from the mallet and band driver in an apical direction on the buccal side of the band are often advisable, in order to gain better adaptation and the proper height of the anchor sheath, as the latter must in all cases be *entirely free from antagonism* with the opposing tooth.

The nut must now be further tightened until the screw begins to draw lingually from the mesially approximating tooth. To arrest this undesirable movement of the screw and prevent the interference of the screw with the freedom of the tongue, the chief objection urged against the use of the clamp band, I have devised an instrument which effectively supports and holds the screw in exactly the right position while the nut is being further tightened, namely, firmly against the lingual sur-

face of the mesially approximating ally during the tightening of the nut. tooth. It also holds the screw at the Its use is indicated at this point. The

FIG. 21.

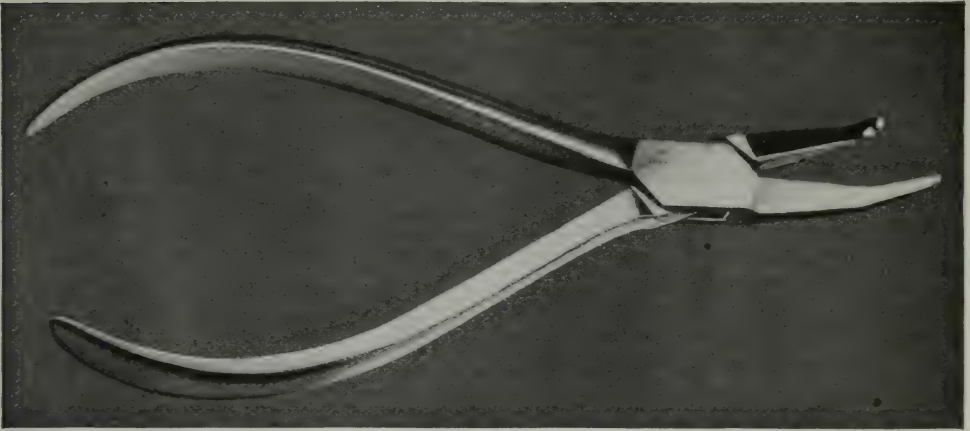
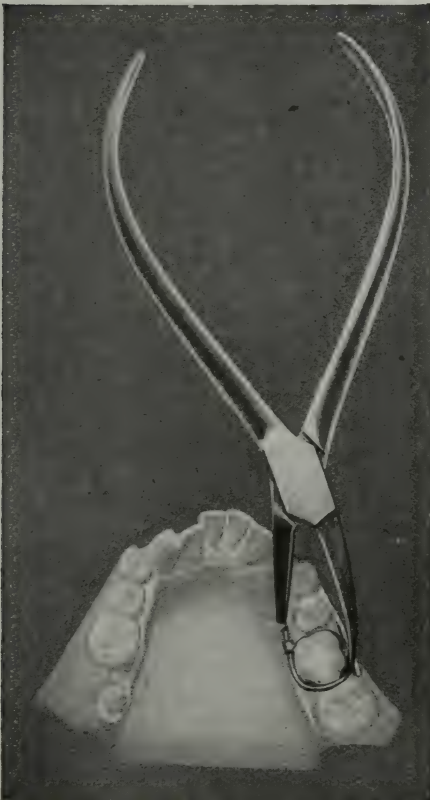


FIG. 22.



instrument is illustrated in Fig. 21 and shown in operation at Fig. 22. It is a pair of gracefully proportioned pliers. One of the beaks is long, slender and curved to engage the buccal portion of the band occlusally to the curvilinear sheath. The other is much shorter and near its end it is bent sharply downward. It is provided with a deep groove across its inner surface, which is for the purpose of engaging the screw of the clamp band, and when it is placed in position and the handles grasped firmly and steadily held, the nut may be tightened to any degree without unfavorable displacement of the screw.

Obviously a pair of these pliers is necessary to meet the requirements of all parts of the mouth.

With firm support given the screw with these pliers the tightening of the nut is now continued until very close adaptation of the band at its gingival margin has been gained. Its occlusal margin is now accurately burnished to adaptation to the crown.

At this point the nut is loosened and turned well back and the band is carefully removed without in any way disturbing its present form gained through close adaptation. This is important. It is now thoroughly dried and a small amount of paraffin is flowed over its inner surface, the tooth being thoroughly

proper height and prevents the band from sliding either gingivally or occlus-



cleansed, and the band and nut are again adjusted to exactly their former positions. A band properly made will bear sufficient tightening to allow perfect adaptation to be gained without breaking, especially if it be made of a proper quality of nickel silver. And for clamp bands I prefer nickel silver, as the precious metal lacks the stretching and consequent adaptive property possessed to such a marked and satisfactory degree by the former metal.

The screw should now be cut off on a bevel close to the nut and smoothed. There should not be a great ornamental (?) ball of metal fused upon its end, as I have so often seen done with this and other orthodontic mechanisms. This is bad mechanics. The beveled, burnished surface is always better.

The prominent corners of the nut should now be rounded and burnished, to cause as little interference as possible.

And here is something else to be avoided. You have all seen the gum injured by food being wedged between it and the nut of the clamp band. This is a condition that is wholly unnecessary and is the result of leaving the nut at such an angle as to form a V- or funnel-shaped opening between its inner side and the tooth, as on the right of the illustration (Fig. 18). Now if you will turn the nut so as to reverse this V-shaped opening, or so that the funnel will be beneath, as on the left in Fig. 18, food cannot lodge there, but will drop through the space which will be self-cleansing, the same as are the normal proximal spaces between the teeth. Think of this and act upon it.

So far I have said nothing relative to the alignment of the sheaths. When it is necessary the sheaths should be resoldered in correct alignment and this should be done just before the bands are finally set in paraffin.

#### PARAFFIN FOR ATTACHING THE BANDS.

Now a word with regard to the new medium, paraffin, which I am proposing to take the place of the time-honored cement. Doubtless the suggestion will

occasion surprise and, of course, skepticism. It has not yet been proved better than cement. This must be determined by the test of time. But I think you will at once recognize its possible advantages over cement for molar bands. Because it has little or no cohesive power it can add nothing to the strength of attachment, but with a clamp band adjusted as I have described, no strengthening medium is necessary, as the band will be so firmly clamped and adapted to the tooth crown it could not be displaced without breaking it. In your experiments with it you will note that as you tighten the nut the superfluous paraffin will be forced from between the band and the tooth in the form of a gossamer-like ribbon, leaving but very little within, but enough to thoroughly fill any possible space. The use of the paraffin is wholly for the exclusion of moisture and the protection of the enamel, and for this it will, I believe, prove wholly reliable. Surely if paraffin is a principal reliance for the protection of modern submarine cables, we may have reason to believe that it will protect tooth enamel, and it cannot present a ragged irritating margin to the gingiva, as cement too often does.

Naturally the question will be asked, why not apply the paraffin to the band before first placing it over the crown of the tooth and thus save the trouble of removing the band for the purpose later in the operation. The reason is that when applied in the beginning it causes the band to slip and makes its adjustment difficult. But if the band is first very accurately and completely molded to the form of the tooth the paraffin will not contribute measurably to its displacement during retightening. A very little powdered emery or carborundum combined with the paraffin will probably be an advantage, as it will tend to check the slipping of the band.

So far paraffin has been used in my own practice for about eight months, and with satisfaction. Dr. James C. Angle writes me that after wearing in his own mouth for fourteen months, with no ill results, a band adjusted as



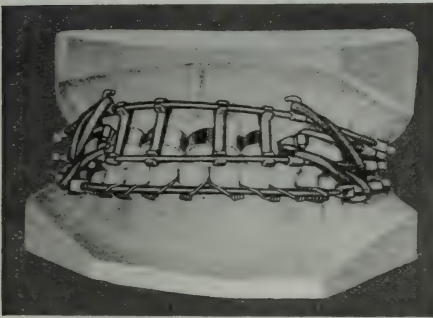
above described and set in paraffin, he is using it exclusively in his own practice.

Use it intelligently, but of course keep the necessary careful watch on it until you are certain that it is an improvement. One thing is certain: that unless you are careful and patient in thoroughly mastering the technique of fitting the band when using the paraffin you will not be successful in its use.

#### WIRE LIGATURES.

The wire ligature, as you all know, has played an important part in the development of orthodontia, and justly so, as it is so simple a means of applying

FIG. 23.



force, so compact, cleanly and inexpensive and, when skilfully employed, very efficient. Yet it is a surprising fact that of the vast number of times it is used each year, probably in only a small percentage of cases is it applied so as to gain its full efficiency. I have watched many orthodontists apply many wire ligatures, and I have almost invariably found that they adjust them in such a manner as to render them even at first only partially efficient, and that in a few hours this efficiency is further reduced or entirely lost.

The plan of applying the ligature commonly followed is to encircle tooth and expansion arch with a short piece of the wire the ends of which are crossed, and then with the fingers to effect a few twists. The twist so made is then

grasped by pliers and more twists given. The ends are then cut off and the twisted portion bent to one side, as shown in Fig. 23.

If a ligature so applied be examined immediately it will always be found to be exerting but very little tension on the tooth, as it can be readily pushed to one side on the expansion arch with the finger nail, and if it be examined a few hours later it will be found very loose, wobbly and ineffective, and from that time until the next visit of the patient it is little more than a useless encumbrance and often a direct irritant to the tissues.

Now the error is, twisting of the ligature has been depended upon to gain the desired degree of tension upon the tooth, or between tooth and arch, when in reality very little power can be gained in that way even though the twisting be carried to nearly the breaking point of the wire. Another error is in bending the ligature to one side after the twisting, as most of the strain is then borne by only one of the strands, that on the other strand being diminished. Of course some orthodontists continue the twisting of the strands as the ligature is bent to one side, in this way maintaining somewhat more nearly equal tension upon the strands. Nevertheless the full maximum tension equally upon both—so important—is not thus gained.

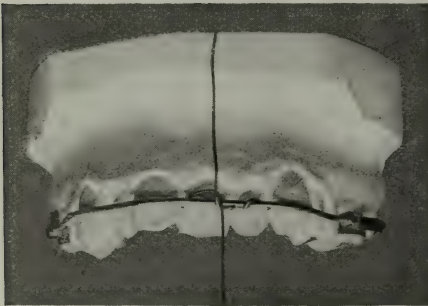
All these statements can be easily verified by simple experiments, and the wonder is that orthodontists do so little experimenting, but instead usually follow unquestioningly methods that may so easily be proved to be wrong.

There is a right way of applying the ligature, or one that is certainly in far closer accord with the principles involved, by which the full amount of force desired may be gained and continuously maintained, *the twist being used only as a means of locking the strands* and holding the tension which is gained otherwise.

The two ends of a piece of ligature wire of ample length, after having been crossed, as in Fig. 24A, are firmly grasped, one in each hand, and evenly

and steadily drawn perpendicularly in opposite directions until the desired firm tension has been gained. (Each end should be at least six inches long to afford ample grasp for each hand, though obviously the full length of the ligature cannot be shown in the illustration.) Then by maintaining the same steady tension, with the hands held in the same relations, the ligature is locked by giving the two ends one full turn or twist to the right. Any additional twisting is absolutely unnecessary, as it adds nothing to the firmness of the lock. It would indeed be harmful, for it would leave superfluous metal to interfere with

FIG. 24A.

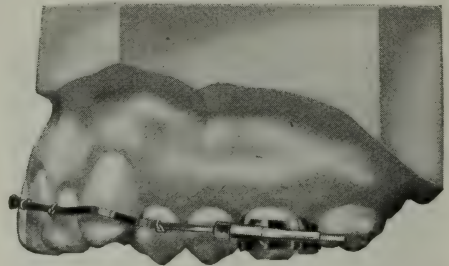


the lips. The surplus wire is now cut off with the pin-cutters, leaving ends not more than one-thirty-second of an inch in length, each of which should be closely pressed against the arch, the pressure being exerted in the direction of the twist. The result is shown on the left first bicuspid in Fig. 24B.

If the operation has been done properly the lock will not only be fully efficient, but it will not be displeasing in appearance, will not obstruct the toothbrush, and will offer but the slightest interference with the lips, and the tension on the ligature will be borne equally by both its strands. Also, the ligature will not become loose and act as an irritant to the gums. It should be axiomatic that a ligature or any other attachment can be efficient for the control of force only in proportion to its firmness and its faithfulness in maintaining tension.

All this was made clear at the time, long ago, when I first advocated the wire ligature in preference to the fibrous ligature.\* I have not, however, previously made clear, as I probably should have done, the proper way of grasping the ligature with the hands, for this has seemed to me self-evident. The ends should be grasped in the same way (the natural way) that the ends of a stout piece of string would be grasped if it were desired to break the string, namely, one firmly in each hand, the fingers closed, and the ends of the strands pressed between the thumb and forefinger of each hand, the main pull being

FIG. 24B.



borne by the under sides of the two little fingers at their second joints. This gives a far firmer grasp than is possible when the strands are held between the thumbs and forefingers only, as nearly all will persist in doing.

Notwithstanding the simplicity of this method of applying the wire liga-

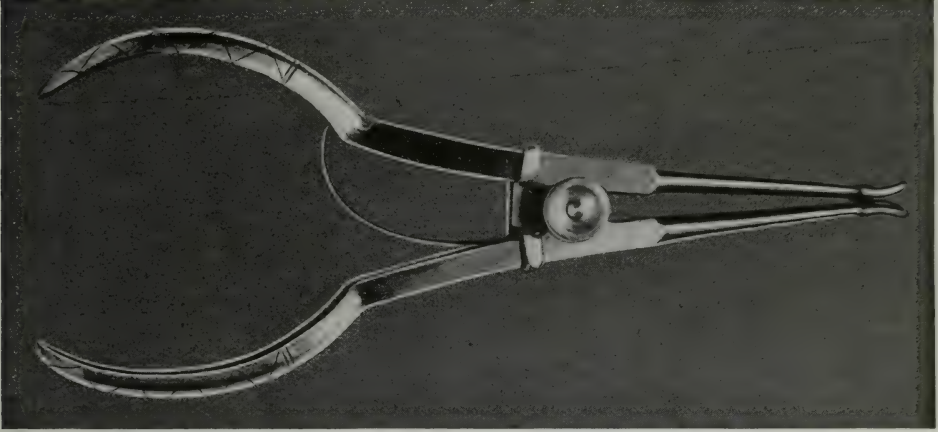
\* The temporary revival of the use of fibrous ligatures a few years ago was in all probability due to the inability of their advocates to properly apply the wire ligatures, for I am sure that anyone who masters the correct use of the wire ligature will have little use for the slippery, very unsanitary, stretchy fibrous ligature, especially the one most advocated—the silk cable—for it was found as a result of carefully conducted experiments by Prof. Raymond C. Osburn and myself, a report of which is to be published by Prof. Osburn, that these ligatures gradually stretched under moisture to a surprising extent, often more than thirty per cent. This anyone can easily verify.



ture, I have become convinced that most orthodontists cannot or will not learn it, regardless of the amount of their own and their patients' time that is wasted through the inefficiency of wrongly ap-

plied ligatures. Pondering this, I was led to wonder if some instrument could not be devised with which to perform the operation more easily than is possible with the fingers, and with equal

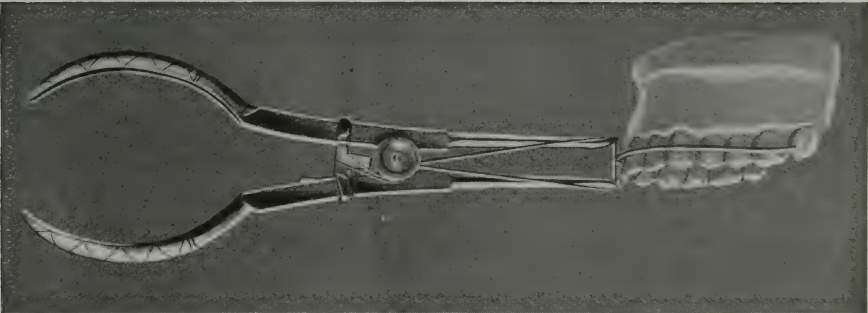
FIG. 25.



plied ligatures. Pondering this, I was led to wonder if some instrument could not be devised with which to perform the operation more easily than is possible with the fingers, and with equal

It is a pair of slender forceps with long beaks which separate as the handles are closed. The ends of the beaks are provided with perpendicular slots for the reception of the strands of the wire

FIG. 26.



or greater accuracy and efficiency. I therefore began experimenting. As is usually the case with early efforts my first models were so complicated as to make them impracticable, but I continued, and now, after three years, the

ligature after they have first been crossed in the usual way, or as they would be if they were to be grasped by the hands, as above described. After engaging the strands in these slots the ends of both strands are tightly grasped between the



thumb and forefinger of one hand and given two full turns around the tension button attached to the pivot in the hinge of the pliers, as shown in Fig. 26. By pressing on the handles of the pliers with the fingers any desired degree of force may now be given for tightening the ligature. It will be noted that the power is under the most perfect control and that it is exerted in the direction best suited to give tension to the ligature and to press inwardly upon the expansion arch, this being the main object of the ligature, namely, to spring the expansion arch toward the tooth that is to be moved and thus enlist spring tension from the arch which will act continuously upon it for a long time. Think carefully over these points. After the expansion arch has been drawn in actual contact with the tooth (which should always be done when the ribbon arch or delicate round arches are used), the handles of the pliers are locked with the slide ring with which they are provided, and rotated to the right one full turn, thus effectually locking the ligature and maintaining the full tension previously gained. The wire is now clipped off close to the inner beaks of the pliers, the latter removed, and the free ends of the wire cut off the regulation length and disposed of exactly as previously described.

No human hands can apply and control force so evenly and painlessly in the placing of the ligatures, and a ligature so placed will not become loose and a source of irritation to the soft tissues.

In learning to use these pliers you will at first break ligatures, as force is exerted so easily with them, but, as in the use of the new band-forming pliers, in a little while you will learn the right "feel" as you press the handles, and will be delighted with the use of the new instrument.

Another point. Discard for all time the smallest ligature wire. It has no advantages over the medium and large wires, but the decided disadvantage that it cannot be firmly locked under the tension that would be necessary to make its use efficient for the movement of

teeth, due to the slight amount of metal it contains.

#### THE ORTHODONTIC WORK-TABLE.

The orthodontist, as you know, has inherited from dentistry the larger part of his office equipment, that is, the swinging bracket, the cabinet, engine, cuspidor, laboratory work-bench, etc. Now all of these are doubtless beautifully adapted to the needs of the dentist, and they represent the fruits of many of the best minds in dentistry for many years in the elaboration and refinement of dental furnishings. But they are by no means best suited to the needs of the orthodontist, for his work is radically different from that of the dentist, naturally requiring just as different tools and fittings for his convenience. Very important among these is a suitable bench or table which shall also be a receptacle for his instruments, and this should be close at hand so that he need not be compelled to make frequent excursions to a cabinet more distant from his patient, or to a work-bench in his laboratory. In watching orthodontists at their work I have often noted that frequently more time is consumed in such excursions than is required for the actual work in hand. Besides, *such interruptions are very disconcerting in the delicate technical work on which the eye and mind should be concentrated, and tend to impair its quality.*

Fig. 27 illustrates a work-table which I believe to be far better suited to the needs of the orthodontist than anything to be found in the dentist's equipment.

The wobbly and unsteady dental bracket and the dental cabinet long ago became unsatisfactory to me. Then came the wall bench, shown in both the sixth and seventh editions of my book. This was better, but the constant diversion of thought necessary in turning away from the patient to the bench attached to the wall at the side of the window led me to place a stationary shelf directly in front of the window, but the distance between shelf and patient was still too great. Then came the thought

of a movable table, to be placed directly in front of the operating chair. It seemed promising. So a table of rough workmanship was constructed and then repeatedly modified until the proper height and width of top, width between the legs to permit the lateral swing of the footrest of the chair, number and dimensions of drawers to render it most

that it might have the requisite stability with the desired lightness and delicacy. The result is as you see it—a very firm and substantial, yet graceful table.

The top of the table is of sufficient size to afford plenty of room to perform all of the various operations of band-making, soldering, cement-mixing, impression-taking, etc. The table con-

FIG. 27.



convenient, had been carefully worked out. It was then given over to our beloved teacher of art, Mr. Wuerpel, who very kindly gave it much consideration, and, while maintaining the previously determined proportions, worked out a design of pleasing outline for the table. This pattern was then taken to a very reliable firm of great experience in the making of fine furniture to work out the best way to construct the table in order

that it might have the requisite stability with the desired lightness and delicacy. The result is as you see it—a very firm and substantial, yet graceful table. The top of the table is of sufficient size to afford plenty of room to perform all of the various operations of band-making, soldering, cement-mixing, impression-taking, etc. The table con-

tains four drawers of generous size which, being divided and subdivided by partitions into compartments, furnish ample room and to spare for a stock of all necessary instruments and appliances, absorbent materials, etc. There is a natural place at the left end of the table for the assistant to stand, where she may be in close touch with the work and ready for instant co-operation.



A very important feature of the table is that it is provided with four large, very true casters that have mechanically accurate bearings and that move on a novel form of track, so that the table may be noiselessly moved backward or forward as easily and with greater certainty than the usual dental bracket is moved. In fact, the friction of the index finger on top of the glass slab which covers the table is sufficient to move it as desired, and the orthodontist soon forms the habit of moving it unconsciously to be near to his patient or farther away as he at the moment requires, without loss of concentration on the immediate work in hand.

The receptacle for the spraying fluid, the Grünberg soldering lamp, etc., are caught on hooks at the back of the table where they are out of the way, and, what is better, out of sight when not in use, yet always within easy reach when required.

One objection to the table which will doubtless be raised is that in some instances it may interfere with the connections with the fountain cuspidor. But I think that these elaborate, bulky cuspidors can with advantage be dispensed with in orthodontists' offices. While they are necessary to oral surgeons, rhinologists, exodontists and dentists, the orthodontist, not being a blood-letter, does not really need a fountain cuspidor. In fact, he has but little use for a cuspidor of any kind. My own is a beautiful Japanese bowl which occupies an artistic pedestal in a corner of the room where it is out of the way. When it is needed it is brought on its pedestal to the patient by the assistant and then returned to its place after it has been cleansed.

Of course this table will not meet the demands of the "old school" orthodontist who requires a miniature machine-shop with innumerable tools for the construction of his appliances from raw materials, but for the truly up-to-date orthodontist it meets all requirements.

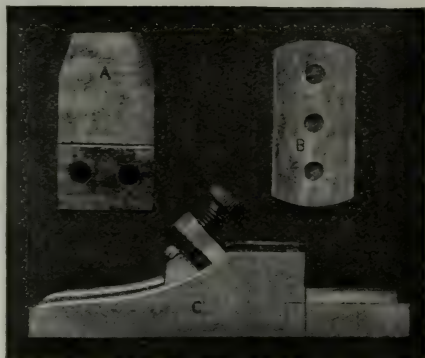
Some twenty of these tables are now in use among my former students and all are greatly pleased with them. With this table, in conjunction with the

beautiful, graceful child's chair, I am sure the work of the modern orthodontist will henceforward be much easier than heretofore and the general appearance of his operating room greatly improved.

#### PLASTER PLANE.

As you all know, accurate models of the teeth of patients are indispensable to the modern orthodontist, and, as I long ago pointed out, a man's skill and ability as an orthodontist can be quite accurately estimated by the skill he dis-

Fig. 28.



plays in making models and in his appreciation of them. So anything that will assist in the production of good models is obviously desirable.

The model plane, c Fig. 28, has become recognized as a necessary part of our equipment, yet to be of much use the blade of the plane must always be kept extremely sharp, and unfortunately but few ever learn to keep it in proper condition. So here is an idea that is practicable and will be found very helpful to this end. It is to face the hard brass blade of the plane with steel. To do this, flow a little soft or tin solder over the face of the brass blade, distributing it evenly while in the molten state with a pledget of cotton saturated with soft-soldering fluid; also apply soldering fluid to the clean surface of a safety razor blade (Gillette's are best, B Fig. 28); then clamp the razor blade



into the exact position desired on the brass blade with paper clips and slowly, very slowly, heat over the flame of an alcohol lamp until the solder melts. Do not carry the heat beyond the melting point of the solder or allow the flame to come in contact with the projecting edge of the steel blade or its fine temper will be ruined. The surplus ends of the steel blade should be removed by grinding a shallow groove across them with a

perpendicular slots in the outer rim of the impression tray at points corresponding to the normal location of the cuspid teeth (Fig. 29). After the tray and plaster have been seated in the mouth little strips of metal are inserted in these slots and allowed to remain until the plaster has set. (One of the little strips is shown between the two trays in the illustration Fig. 29.) They are then removed, together with all loose pieces of

FIG. 29.



thin carborundum disk, when they can be easily snapped off and the remaining ends made even and true by grinding. The result will be a very fine cutting blade of excellent quality, a Fig. 28, and one so thin that it may be quickly sharpened on an Arkansas stone.

I am glad to learn that one of our number is working on a high-speed motor plane that promises well. I am sure we all heartily wish him success.

#### IMPRESSION TRAYS.

Here is an idea given to me by one of the laity, which lessens the difficulty of impression taking. It is to saw two

plaster, followed by the removal of the tray which will be found to loosen readily as the slots admit air. The plaster is then easily broken at these weakened places, the time and trouble of cutting the grooves, heretofore necessary, thus being saved; also, in most cases, reducing the number of breaks in the impression. I now use this plan altogether and it is excellent.

The little strips of metal should be straight, smooth and quite stiff, and about one and one-half inches long. They are best made from heavy separating files, as the latter are of proper width, thickness and rigidity.

It should be needless to caution you that the slotted tray must not be bent out of shape while placing it in the mouth, as it might easily be.

THE BRACKET ATTACHMENT IN RETAINING MECHANISM.\*

It would be difficult to imagine a more efficient means of retaining teeth, after they have been moved into the desired positions by means of the ribbon arch, than the same mechanism that effected the changes, and indeed it may be so employed to advantage for a few weeks, at least, until the teeth have become somewhat habituated to their new positions. Then this mechanism may be wholly removed and a type distinctly for retention substituted, or the original mechanism may still be continued, gradually dispensing with certain portions of it as they become no longer necessary; for example, one or both of the anchor clamp bands, together with greater or less portions of the sides of the arch, finally gradually reducing the length of the remaining anterior segment or even removing a portion from its center, etc.

This plan I have followed successfully in a number of cases, but as the retention period is distinct and of marked importance in treatment, often necessitating the wearing of the mechanism for a considerable time before the forces governing occlusion have become thoroughly normalized and working harmoniously (even indefinitely if pernicious tongue or lip habits have not been overcome), it seems to me the part of wisdom to employ for the purpose only such mechanism as will be in the very closest accord with the requirements of retention, *i.e.*, with physiology, art, dynamics and hygiene. These requirements of course do not materially differ from those of active treatment except as to art and dynamics, but as very little

force is required to statically maintain teeth in their normal positions, there may be less sacrifice of art and hygiene to dynamics. Therefore the retaining appliances may be more delicate than those employed for treatment, and they may also largely be placed lingually to the teeth.

Now as no form of orthodontic mechanism is more simple and efficient than the ribbon arch and its attachments, nor more easily adjusted and manipulated, its modification to conform to the demands of retention required little more than to increase its delicacy. Realizing this I have so modified it.

As nearly as I have been able to determine by experimentation, most of

FIG. 30.



the parts may be reduced a little more than one-third and still have ample strength, that is, the bracket in length and width, and the band material in width; and for most cases plain round wire .022" in diameter may be substituted for the ribbon arch. For special cases where there has been lingual or labial movement of roots which require support, flat or "ribbon" wire will be necessary, but it need not be more than .028" in width instead of .036".

The parts of original size for active treatment, and as reduced in size for retention, are shown in Fig. 30, the round wire being locked in position in the bracket in the second piece of band material; the delicate, flattened wire being beneath it. I hope in due time the two wires and the bands and brackets of reduced size for retention will be furnished us by the manufacturers.

In use the bracket bands are most carefully and accurately fitted to such

\* All that I have here to say with regard to retention was ready at the time of our last meeting at New London, Conn., but the allotted time was too short to permit its general presentation. It was, however, discussed with a few privately.

teeth as require banding, either for special support or for anchorage. The round or flat wire is then bent and very

of a tooth that has dropped slightly out of alignment the wire may simply be unlocked, removed, its form modified as

FIG. 31.

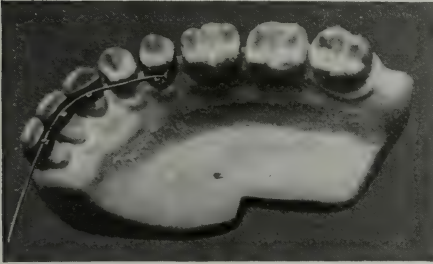
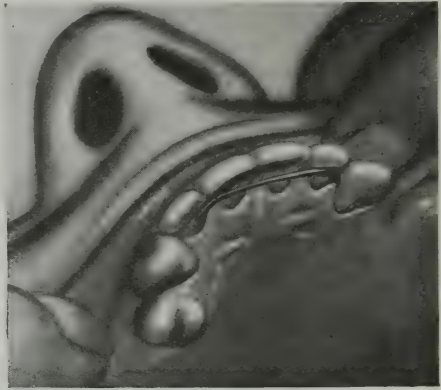


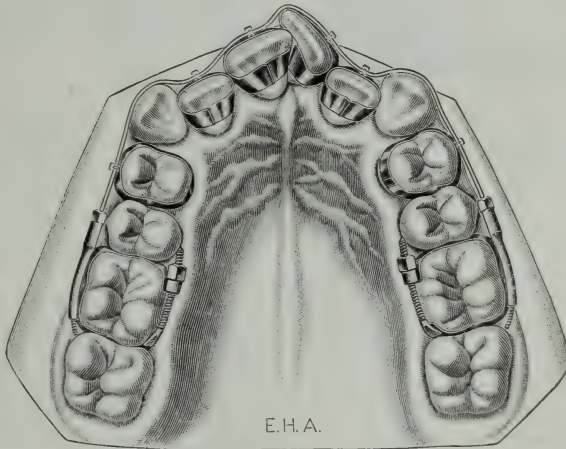
FIG. 32.



easily seated in the brackets by means of the fingers, and effectually locked with the pins, after the manner shown in Figs. 31 and 32. Great caution should be observed to shape the wire before seating it so that it will lie passively in its relations with the moved teeth, otherwise it

required, and replaced, all with the greatest ease and very quickly. It is a true "working retainer."

FIG. 33.



E.H.A.

will exert undue tension on them, as a result of which they will soon be moved out of their corrected positions.

The great advantages of this form of mechanism over that with brazed attachments are its ease of application and especially of modification. If it becomes necessary to modify it for readjustment

As you are all orthodontists, with abundant experience in the retention of teeth, it does not seem to me necessary to show you numbers of cases of types commonly met with in the various classes of malocclusion that may readily be retained with this form of mechanism. You should at once see its advantages



over the usual brazed attachments and easily realize how greatly your time and that of your patients may be conserved in its use, and how perfectly the static force required for each individual tooth may be controlled. I do not for a moment suppose that we can ever entirely dispense with brazed attachments, as this form of attachment represents the maximum in strength and delicacy. It is therefore the most desirable in some instances, yet I feel certain that in most cases the more convenient bracket attachment can now be substituted for it with advantage. Very often we may combine the two in the same apparatus.

FIG. 34.



For example, in Fig. 18 a segment of wire made to rest within lingually placed brackets on the incisors would effectually retain these teeth, and a longer segment of wire with additional bands and brackets could be applied for the retention of the cuspids, but a simpler and better plan would be to solder spurs to the disto-labial angles of the bands on both laterals to engage and support the cuspids, thus avoiding the use of two extra bands upon these teeth. And these spurs might, if occasion required, be continued distally to engage brackets on one or more of the bicuspid to prevent their lingual or rotatory displacement, etc.

In retaining the teeth in the case shown in Fig. 33, after their present positions had been corrected, practically the same combination as that just described could be used, substituting it for

the mechanism now shown upon the teeth, but employing the two bicuspid bands already in position.

Although the illustration, Fig. 34, represents a very poorly made model, selected from a large number that have been sent me, it is sufficiently accurate to illustrate how very effectively the bracketed bands supporting a lingual arch of round wire would retain these badly malposed teeth after the dental arch had been properly enlarged and the teeth brought into correct relations with the line of occlusion. In its application the retaining bands would be placed on the second bicuspid and the cuspids, the arch, after having been carefully shaped, being seated in lingually placed brackets on these teeth. To give additional firmness to the two ends of the wire, spurs should be soldered to the disto-buccal angles of the bands on the second bicuspid to bear against the mesio-buccal angles of the first molars.

Of course where the "bite" is very short the brackets would so interfere with opposing teeth as to make their use impracticable on the upper dental arch, but such instances should be very rare, for the new brackets will be so short and the bands to which they are attached will be so narrow and may be placed so close to the gingiva as usually to give no interference. If they could not be so employed it would be almost certain proof that the proper heights of the teeth had not been gained during the prior treatment.

Even in such cases as shown in Fig. 13 this mechanism could easily be used for the retention of the upper incisors.

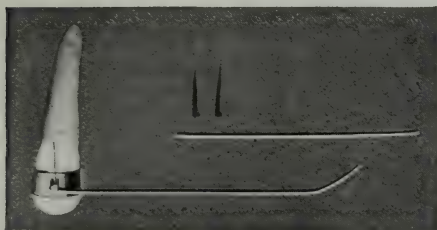
The lock pins that should usually be employed would be those of standard size or the same as those used in active treatment, but one of special proportions will often be required. For example, if spaces between teeth have been closed the teeth may be prevented from sliding along the wire and again separating, by filing a delicate notch in the side of the retaining wire directly opposite the pin slot in the bracket, and, instead of the usual pin, inserting one of greater width, which will engage both the bracket slot

and the notch in the wire. This will serve the double purpose of locking the wire within the bracket and of preventing the tooth from sliding laterally. The same plan may also be employed to prevent the sliding of teeth in the opposite direction and closing space that has been gained.

The width of this pin will be .004" greater than that of the standard pin, but it will be of the same thickness. It is shown in comparison with the standard pin in Fig. 35.

It is very efficient and may often be used in other ways, important among which is to support the end of the retaining wire that it may not slide distally or

FIG. 35.



be pulled mesially through the bracket, etc., as in Figs. 31 and 35. In this illustration is also shown the notch for the reception of the pin in the side of the detached wire near one end.

If it is found desirable to shift the wire mesially or distally, either in retention or in treatment, another notch is made in the wire at the point desired and the pin made to firmly lock it in this position.

Cleats or little spurs soldered to the wire to engage the sides of the bracket would effect the same purpose, but the pin is simpler and more easily employed.

I know that many will attempt to apply this special pin in so bungling a manner that it will not be successful in their hands, but to the orthodontist who appreciates the advantages of delicate mechanism and will learn to employ it correctly by first properly locating with a suitable instrument the exact point at

which the notch is to be made in the wire, and will then file the notch at the proper angle and to the proper depth, so that the pin may be mechanically seated, it will be a source of much satisfaction. Of course the wider pin may be employed with the wider ribbon arch and usual type of bracket, when desired.

There is another use for this more delicate arch-bracket mechanism which I think will appeal to you all. It is for correcting malpositions of deciduous teeth or recently erupted permanent teeth in mixed dentures, where it may be used either lingually or labially to the teeth. The power will be found ample for the movement of such teeth in a physiological manner. I might give you many examples of where it could be so employed, but already you should see its many possibilities and advantages in numerous cases that must now be pictured in your own minds. I hope you will study it most carefully and employ it intelligently, and if you will do so you will know that we have made progress this morning.

This is a good time to discuss another question of importance, namely, whether orthodontic mechanism can be employed more advantageously lingually to the teeth or labially to them.

I believe the question is not difficult of solution if we will again employ principles as a basis from which to reason and to make deductions.

Now it seems very clear to me that the most natural place for the application and operation of active orthodontic mechanism is labially and buccally to the teeth, as there is here far greater opportunity for the freedom of force and for force control as compared with the much more restricted lingual region of the dental arch. The labial and buccal surfaces of the teeth are broader, offering greater possibilities for power grip, besides being decidedly more accessible for the application of mechanism which here offers less interference with the functions of the mouth and is more easily kept clean by the patient. Compare for a moment the possibilities of force control of appliances operated lin-



gually to the teeth with those operated labially in the rotation of cuspids, bicuspids or incisors, or in fact for the considerable movement of any of the teeth, and you certainly must realize that the advantages are greatly in favor of those operated labially.

Of course by no means would I restrict active mechanism to the labial and buccal surfaces of the teeth, for instances may occasionally arise where lingual mechanism would be more advisable, as for example, in very simple cases of very young patients, where the simple widening of the dental arch, possibly accompanied by slight movements of incisors, is required. Indeed all movements of the teeth may be accomplished with lin-

gually operated mechanism, but much more time would be required for the same movements, as well as great inconvenience caused both patient and operator, than if it were operated labially. I think this fact, in many cases, at least, accounts for the enormous amount of time that is wasted by many orthodontists in the treatment of their cases.

I had hoped to discuss still other questions relative to treatment with you today, but lack of time will make necessary the deferring of them until our next meeting. Meantime I would leave these simple injunctions with you: think more sharply; reason more carefully; work more delicately and accurately.

1025 N. MADISON AVE.

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## The Cervical Line of the Lower Teeth.\*

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By TH. E. DE JONGE COHEN, Dr. Med. Dent. (Zürich),

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(From the Anatomical Laboratory of the University of Amsterdam.  
Director: Prof.-Dr. L. Bolk.)

IT is indeed a remarkable phenomenon that the many interesting problems, anatomical as well as morphological, to which we are led by closely observing the dentition of primates, and especially the dentition of man, have met with so little interest among those very persons from whom we might naturally have expected it. Doubtless this paradox is explained, at least partly, from the fact that those who occupied themselves with anatomical dentition lacked the foundation which is supplied by a correct morphological insight, and have described different phenomena together, where we might properly raise the question of cause and effect.

In the shapes of our teeth there is a very definite correlation in the structure of their component parts. And how can this be otherwise, for not only do they form an anatomical whole but in the true sense of the word they form an organ, *i.e.*, a complex of tissues exercising a definite function. And as such we find next to the specifically organic cells, the enamel, the cementum and dentin tissues, both belonging to the group of supporting tissues. These two kinds of tissues together constitute a real support which in the variation of form of the enamel-cap find a necessary condition for their own differentiation. This differentiation, or more accurately this evo-

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\* The photographs here reproduced have been taken from preparations of Professor-Doctor Bolk, to whom my best thanks are due for the kind assistance given me in my investigations.



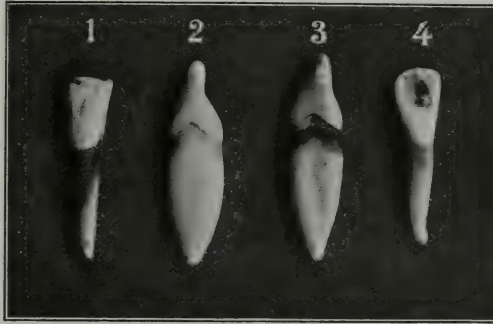
lution, may develop in two ways, but here we see the remarkable phenomenon that development, progressive as well as regressive, besides giving rise to the structural changes of the crown as well as the root, also causes modifications in the cervical line.

B. Premolars. (a) In a normal case the root is of simple structure.

Possibly is: (b) A differentiation into two and sometimes three roots.

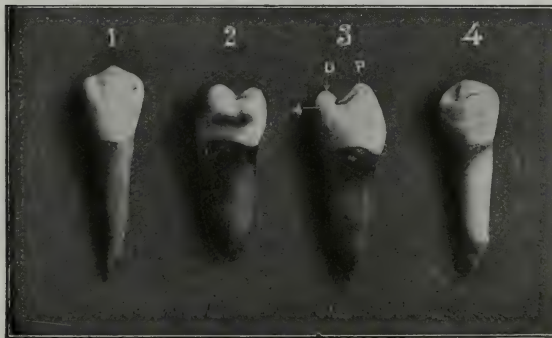
C. Molars. The crown five-, four- or three-cusped. In a normal case two roots. Varieties: the existence of a paramolar

FIG. 1.



Lower incisor: 1, labial surface; 2, mesial surface; 3, distal surface; 4, lingual surface.

FIG. 2.



Lower premolar: 1, labial surface; 2, mesial surface; 3, distal surface; 4, lingual surface.

In the following pages we shall further discuss these differentiations, but before this we shall in a short survey give a scheme of the progressions and regressions of crown and root in so far as they are of any importance to our subject.

A. Anterior teeth, incisors and canines. Normal relations: simple root, approximately compressed.

root (mesio-buccal) as well as a premolar root (disto-lingual).

If we examine what will be the normal structure of the cervical line, we shall at once be able to verify it as fundamentally the same for the single-rooted teeth, both anterior teeth and premolars.

A. Anterior surface. The cervical line describes an incisally as well as an occlusally convex line.

B. Approximal surfaces. Mesially as well as distally, the line between the crown and root is an incisally concave line.

C. Lingually the cervical line, as on the anterior surface, will be convex but at any rate its convexity will be very slight especially with the premolars. (See Figs. 1 and 2.)

Such is the case when the relations are still perfectly normal, when neither crown nor roots are differentiated in any direction. As soon as the structure of the root, however, is modified (it need not even be a complete division of the root), a typical modification will invariably be noticeable in the enamel line. Let us first discuss, however, the condition as we find it with the non-differentiated premolars.

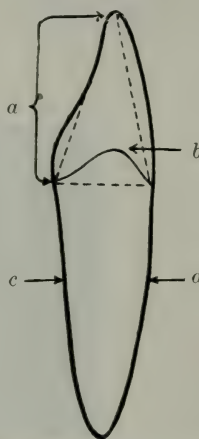
#### I. THE CERVICAL LINE IN THE SINGLE-ROOTED TEETH.

Although it was stated above that with all the teeth the cervical line is fundamentally the same, yet we may at once notice a remarkable difference between premolars and anterior teeth. The concavity of the approximal limits as well as the convexity of the buccal and lingual are much more distinct with the anterior teeth than with the others, where the convexity of the buccal and lingual line is often very slight.

If we attempt to account for this indeed striking difference, it is evident that we shall look here for a fixed correlation with the anatomical characteristics of the two groups of teeth, and I think indeed that I have found the explanation in this direction, *i.e.*, there is a typical distinction in the development of the shapes of the anterior teeth on the one hand and that of the post-canine teeth on the other. For while with the latter the lingual cusps—the deuteromer—develop independently, with the anterior teeth they do not get farther in a normal development than to a cingulum, an inspissation of the gingival crown which higher up merges into the more or less flattened protomer. Through this development the crown as a whole

assumes a typical chisel shape and so becomes more suited for its function and, leaving out of consideration for a

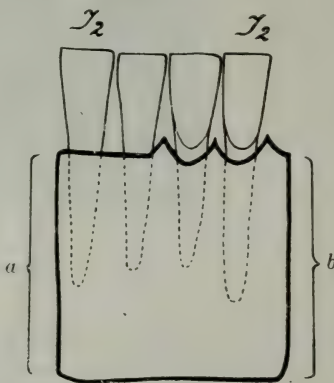
DIAGRAM I.



*a*, Approximal surface of the crown; *b*, approximal surface of the interdental papilla; *c*, lingual; *d*, labial.

moment the strong concavity of the cervical line, we may conceive the circumference of the approximal crown sur-

DIAGRAM II.



*a*, Scheme of a jaw with incisors (hypothetical primitive form); *b*, jaw with incisors (real condition).

face as a triangle of which the angle at the labial base will at any rate be larger than that at the lingual.

Let us now consider the anterior teeth in their mutual relations and we may anatomically establish the following facts:

1. They touch somewhat below the incisal edge.

2. Their approximal surfaces converge, and are tapering toward the apical.

Hence a space will always be formed

is the upper side of the bony septum existing between the teeth.

From a historico-evolutionary point of view we may consider such a condition as a primary condition, but in reality it will always have a completely hypothetical character; for as soon as an interdental space is left between the crowns, in consequence of a divergence of

FIG. 3.



Lower first molars: first row, lingual surface; second row, buccal surface.

between two synergetic muscles which, in a jaw covered with a mucous membrane, is quite filled with an interdental papilla, consisting partly of a cellular tissue and partly of a bony substance. Suppose for a moment we know that this interdental papilla is wanting—as yet not definitely proved, and the approximal enamel line quite straight—not yet so concave as is the case with the anterior teeth, and between the two approximal surfaces of the synergetic muscles from their common point of contact to their cervical lines

the latter, it will immediately have to be filled up by a cellular tissue—the interdental papilla—in order to protect the two approximal surfaces. The height of this papilla, the vertical sides of which (just as with the approximal surfaces of the crown) we may reduce to a triangle, *i.e.*, the papilla as a whole remains below the point of contact, and is considerably below that of the crown, so that the projection on a plane surface will give the triangles in Diagram IV.

Although the two projected triangles

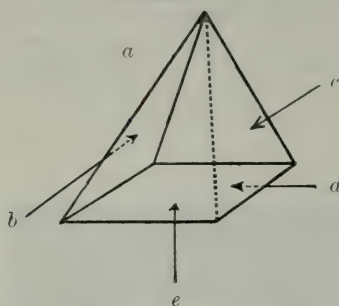


are neither equal nor congruent triangles, there is, however, this similarity in their structure, *i.e.*, the labial angles

trary prevent a firm attachment between the papilla and the periodontium (circular ligament).

The enamel, too, will recede here; not quite to the edges of the papillæ, but remaining a little below them, in this way preventing stimuli (especially mechanical or thermal) from immediately passing to the cementum or periodontium, as is often the case in pathological cases of gingival retraction. That the enamel very closely keeps to the edges of the papilla is proved from the typical

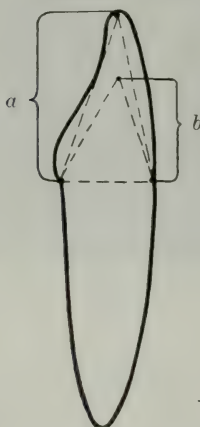
DIAGRAM III.



*a*, Lingual surface; *b*, approximal surface; *c*, approximal surface; *d*, buccal surface; *e*, base.

of the bases of both are the largest. It is of moment to draw attention to the fact that the interdental papilla in the development of its lateral surfaces is

DIAGRAM IV.

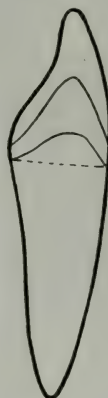


*a*, Lingual surface of the crown; *b*, approximo-cervical line.

closely analogous to the shape of the conformable crown surface.

At the places where the lateral surfaces of the crown are now covered with mucous membrane a coating of enamel will be superfluous and will on the con-

DIAGRAM V.



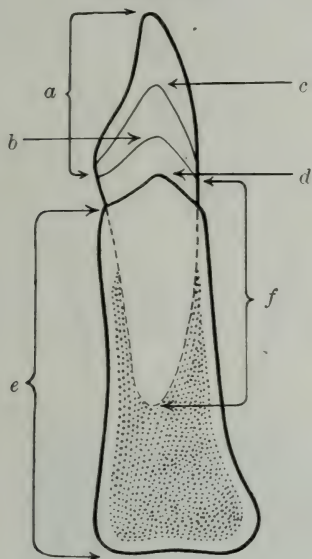
difference of the buccal and the lingual halves of the cemento-enamel line. The former, quite in accordance with the buccal edge of the papilla, rises more vertically than the lingual edge.

So there exists a typical correlation between the shape of the vertical surface of the crown on the one hand, and that of the interdental papilla on the other. And this latter again determines the course of the cemento-enamel line.

Now a few words about the papilla itself. I mentioned above a bony part of the interdental papilla and it indeed seems to me that the upper part of the alveolar septum as to its function certainly belongs to the papilla. Anatomically it is differentiated in such a way that its shape is equal to that of the interdental papilla of the mucous membrane. It will fill up the latter, thus

forming a support which in its anatomical limits entirely follows the papilla of the mucous membrane. So we may in the first instance determine a certain correlation between the approximal limits of the crown on the one hand and the conformable limits of the papilla of the mucous membrane on the other hand. At the same time the papilla of the mucous membrane will be influenced by the cemento-enamel line and the development of the shape of the bony support.

DIAGRAM VI.



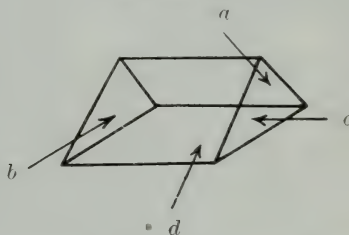
*a*, Crown; *b*, approximo-cervical line; *c*, approximal limit of the interdental papilla; *d*, approximal limit of the alveolar septum; *e*, mandible; *f*, root.

For the sake of completeness we might still mention some details in the structure of the papilla; however, they depend entirely on the degree of convexity of the anterior teeth; for it is clear that every type of tooth determines the limit of the interdental space, and accordingly also that of the interdental papilla. Broomell may rightly observe: "These spaces are largest in that class of teeth found in the nervous and bilious types, where the necks of the teeth are much constricted, and the bell-shaped crown strongly out-

lined. In teeth of this class the point of contact is slight, and the interproximate spaces are only partially occupied by the gum-tissue, leaving a free passage between the point of contact and the gingival margins. In the sanguine and lymphatic temperaments the proximate surfaces of the teeth are nearer parallel with one another, thus making the point of contact cover a greater extent of surface, and reducing the size of the interproximate spaces."

If we view it from Williams' standpoint and assume a classification according to three types (Class I, II, III) it is clear that here, too, every type of tooth, every class, has its own shape of inter-

DIAGRAM VII.



*a*, Approximal surface; *b*, buccal surface; *c*, lingual surface; *d*, approximal surface.

dental papilla. The anatomical differences, however, are so minute that they will be hardly perceptible to a non-practiced eye.

As mentioned above, the interdental papilla in the case of the anterior teeth has more or less the shape of a prism. It is, however, clear that where there exists such a close connection between the structure of the teeth and that of the interdental papilla, the papilla between the post-canine teeth will develop a totally different form; the spaces between the anterior teeth are prismatic; those between the back teeth may assume the shape of a pyramid. A frontal section of the molar papilla will give quite a different image, and the cemento-enamel line congruent with this section will naturally be much less concave than in the anterior teeth. As a matter of course,

this slight concavity goes hand in hand with a smaller convexity of the cemento-enamel line of the two other sides. It will be hardly necessary to point out that with the post-canine teeth, too, the papilla of the mucous membrane is supported by a congruent bony structure in accordance with its function.

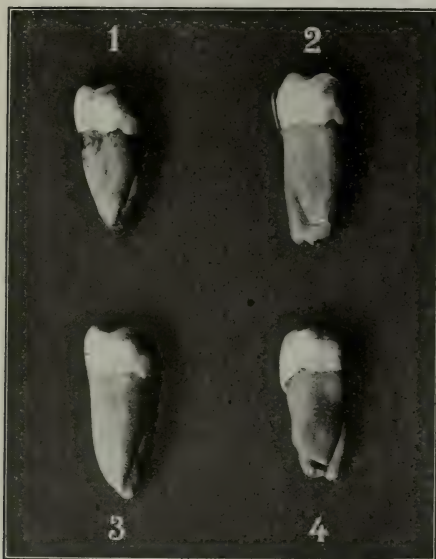
## II. DIFFERENTIATION OF THE CERVICAL LINE.

In the above we have acquainted ourselves with the chief factors influencing

with the molars where, buccally as well as lingually, the enamel line describes a downward curve at the bifurcation of the roots and terminates in an acute point between the two roots.

That the enamel line is much more distinct with the first permanent molar than with the second or the third is a fact which everyone who has had occasion to examine a great number of teeth will have to acknowledge. This fact is entirely in accordance with the historical character of the first molar which, within the deciduous teeth of the catarrhine primates, has developed from an indistinct

Fig. 4.

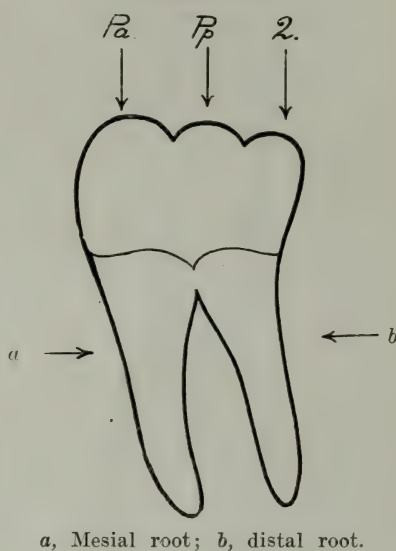


Lower first molars—distal surfaces: 1, 2, and 3, right molars; 4, left molar.

the normal course of the cervical line: the structure of the interdental papilla. Another no less important factor is the differentiation of the roots. As a rule, we may say that with the multirooted teeth, whether this fact of having more roots must be considered as normal or as an anomaly, as a progressive variety, the enamel between the two roots is continued toward the roots as something that might be called a "trace of enamel."

Normally we know of this condition

DIAGRAM VIII.



a, Mesial root; b, distal root.

line to the present condition. Hence I remarked on a former occasion\* that the second and third molars as elements of the endostichos are entirely inadequate for the study of the nicer anatomical details of our molars. So with the molars the condition is that the differentiation into two roots, an anterior and a posterior one, causes the development of an enamel trace dividing the original convex enamel line into two more or less concave parts (see Diagram VIII). This as regards

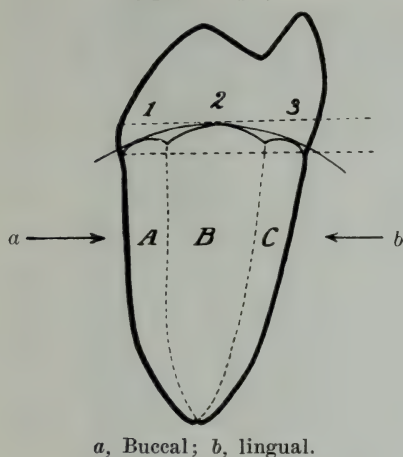
\* "Die Kronenstruktur der unteren Prämolaren und Molaren," p. 129.



the anterior and posterior surfaces; now as to the two lateral surfaces:

(a) *The Mesial Surface.* The original condition, as with the anterior teeth,

DIAGRAM IX.



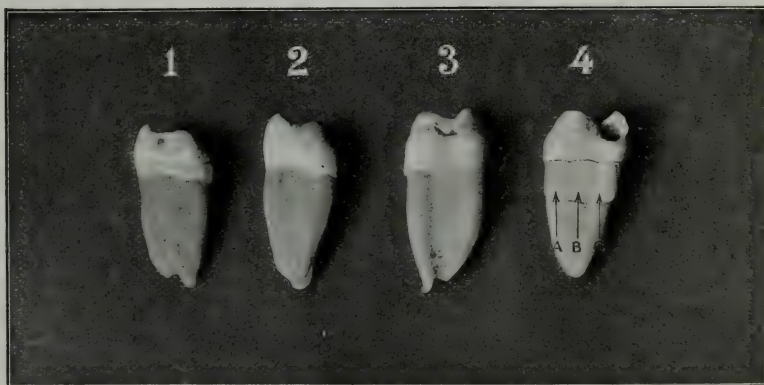
a, Buccal; b, lingual.

is a concave enamel line. But as soon as the mesial root modifies its original shaped structure (in a frontal section)

progressive cases it divides up into three smaller curves, mutually connected by two not very tapering enamel lines. Of these three curves—first as with the conformable root segment—the middle one is the largest and, in a buccal direction, the longest and at the same time the highest. It is always a little higher than the two lateral ones which are practically at the same level; consequently the common connecting-line of the three curves is not a straight line, but a curved one. (See Diagram IX.)

Whether the importance which Van Loon ascribes to this segmentation of root and enamel line is really as great as he would lead us to believe is a question which I presume to answer in the negative. Van Loon, who in a series of articles on the morphology and varieties of the molars of the human dentition occupies himself with the course of the cemento-enamel line, finds the paramolar root is the most buccal of the three root segments, so it is clear that independent manifestation of this root must reduce the number of remaining segments to

FIG. 5.



Lower first molars—mesial surfaces: 1 and 2, right molars; 3 and 4, left molars. In 4, the mesial root has been cut about half, by which (in the original much more clearly than in the reproduction) the splitting up into three root canals is visible.

between the two original segments a third develops (see Diagram IX and Fig. 5). We see how the curved enamel line is also differentiated; in the most

two at the utmost. This, indeed, proves not to be the case; for besides the presence of the paramolar root giving rise to the development of a new enamel line

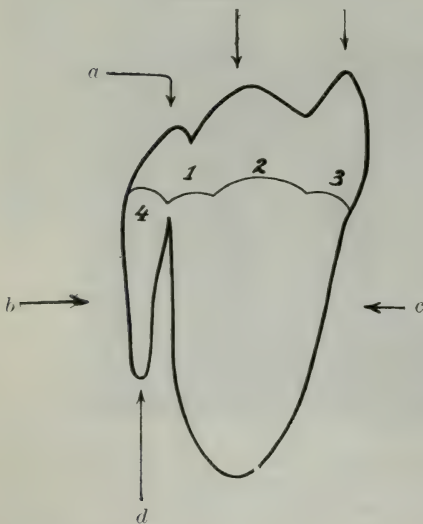
the two original enamel traces appear to have developed also, and so we can verify lines in this case is generally not very

FIG. 6.



Lower premolars: 1, first premolar—mesial surface; incomplete splitting up of the root; 2, second premolar—mesial surface; 3, first premolar—buccal surface; 4, second premolar—buccal surface.

DIAGRAM X.



a, Paramolar tubercle; b, buccal; c, lingual; d, paramolar root.

a fourfold segmented enamel line on the mesial crown surface.

distinct means nothing particularly. I pointed out already that the examination of a great number of molars convinced me of the fact that with the second and third molars the nicer anatomical details would never be so well differentiated as with the original deciduous first molar. Besides we might consider the fact that the first molar never appears with a single root.

(b) *The Distal Surface.* When we now occupy ourselves with the distal surfaces of the molars we have to make a distinction between the four- and five-cusped types, for whereas the cervical line with the four-cusped molars describes a slightly concave line which gradually continues on the two adjacent teeth surfaces, we meet with a very curious phenomenon in the five-cusped molars. At the place where the distal enamel line merges into the buccal surface of the tooth we see near the place of the formation of the cusps (distobuccal and distal cusps) how the cervical line suddenly rises to a sharp point to-

ward the cervix of the crown; just the reverse from what is seen on the buccal or lingual surface, where at the bifurca-

and 2 in Diagram XI) the most lingual of which, having no enamel line, gradually merges into the concave third curve.

FIG. 7.



The jaw—right side. The exposed surface of the jaw bone is of a brown color, owing to a protracted residence in the earth. Owing to the buccal bone-lamellæ having been removed *partly* (only with the cuspid and the third molar we still find the original condition) a dark line is visible under the cervical line; which including the lower enamel line is in a normal case covered with the gums and the approximate part is covered with the tissue of the interdental papilla.

tion of the two roots we pointed out an apically inclined enamel line. At this cervical line extending from the buccal to the lingual root we shall find three curves: two convex ones (numbered 1

It is the latter which in its course has preserved the last indication of the former condition—a simple concave enamel line.

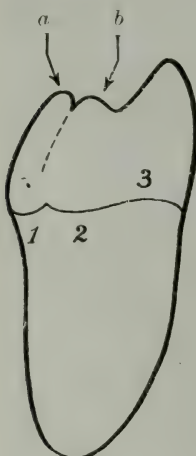
Besides these three curves, the most



buccal one of which, as stated above, coincides with the disto-buccal cusp, lingually a fourth curve may be found in

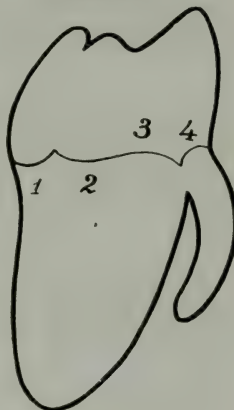
run in a circle around the molar, but that at the very spot where the paramolar root splits up from the disto-buccal root the enamel tapers toward the root and forms an enamel line so to speak. In

DIAGRAM XI.



*a*, Disto-buccal cusp; *b*, distal cusp (2).

DIAGRAM XII.



the first molar when the paramolar root is present. We may then give the scheme shown in Diagram XII.

Van Loon also calls attention to the distal enamel line: "If," says Van Loon,

many cases we only find a slight indication of this enamel trace because the enamel line ends in a curve across the distal roots. Now it is remarkable that this line often consists of three curves ending convexly toward the crown. The

FIG. 8A.



FIG. 8B.



The jaw—left side. *a*, buccal surface and *b*, lingual surface of the interdental papilla of anterior teeth and the premolars.

"we closely follow the line between the enamel of the crown and the cementum of the root we see that this line does not

separation between the disto-lingual curve and the middle curve is in the bifurcation of the premolar root and the

disto-buccal root, whereas the separation between the middle and the disto-buccal curve is on the broad disto-buccal root, not exactly in the middle, but more toward the premolar root. These three curves are not always distinguishable, especially the middle and the disto-buccal curve may end in a straight line running in a circle around the molar. With the normal lower molars, where the enamel line of the distal root forms one complete circle we often find this line not being straight, but in a curve, while in these curves I think I see the indication of the amalgamation of an equal number of separate roots." But when Van Loon in this connection only mentions three curves he evidently considers the two concave buccal curves (1 and 2 in Diagram XII) as one single convex curve. In the photograph (Fig. 3a IX) given by him the four curves I described are clearly distinguishable so far as the molars are concerned.

### III.

When discussing the single-rooted teeth, we referred to their anatomical character. As soon as we give up descriptive anatomy in order to define the morphogeny of their roots it becomes clear that their "single-rootedness" in most cases is but an apparent one and that their real structure almost invariably bears the stamp of a more or less developed differentiation. This may be said especially of the first premolar with which, though it may seem paradoxical in connection with the morphological development of its crown, the tendency toward a dividing up of the root is much more marked than with the second.

In passing it may be observed that the difference in this case is purely quantitative, the modifications with both are of the same type. Omitting further details for the present it is, however, necessary to point out that the result of the splitting up of the root will always be as follows: The partial or complete splitting up in a buccal and a lingual root is often coincident with a similar

splitting up of the buccal root in the more progressive cases, thus forming three roots: two buccal and one lingual root.

It is evident that here, too, the progressive phenomena in the development of the roots influence the course of the cervical line and, in historical succession, the development of a mesial enamel line. We shall thus be able to verify a similar

FIG. 9.



The jaw—right side. *a*, Approximal surface of the crown of the cuspid; *b*, approximal surface of the interdental papilla; *c*, approximal surface of the bony substratum of the interdental papilla; *d*, alveolus of second incisor, with alveolar septum.

segmentation of the enamel line on the mesial and buccal crown surfaces (see Fig. 6, 1-4) of these teeth.

That the enamel line as a rule manifests itself most clearly on the mesial surface is quite in accord with the historical development of the root differentiation which almost invariably starts from the mesial surface in the lower premolars.

Finally, summarizing the preceding

facts, we may state that with progressive varieties in the roots, that is, progressive in a morphological sense, the lower limit of the crown will invariably be modified; the morphological substratum of this modification will be found posteriorly

to the enamel line at the bifurcation of the root.

This being fixed, the question of the genesis of the enamel line needs discussing. I shall discuss this in a future article.

## An Electro-Pneumatic Casting Machine.\*

### Reducing Dental Inlay Casting to a Scientific Process.

By C. S. VAN HORN, D.D.S., Bloomsburg, Pa.

(Read before the Maryland State Dental Society, Baltimore, Md., June 22, 23, 1920.)

IT has been said that "the most important time in all history was when the first man stood up on his hind legs and defended himself with weapons." Since that time man, by inherent and acquired attributes, has accomplished much with weapons and other tools. Through standardization he has, for example, made it possible to buy an electric lamp in Florida and screw it in a socket in Alaska. But neither in science nor trade has standardization progressed so rapidly as has general development. True the tempering of steel has passed from a crude art and indefinite results to the scientific process of heat treatment, which is definite, determinable and readily possible of exact execution by anyone having the necessary equipment and requisite data relative to the physical characteristics of the steel in question and the result desired. Industrial casting is similarly handled. Up-to-the-minute malleable iron foundries do *not* depend upon acquired skill,

personal equation, etc. Knowing the analysis of the iron, suitable furnaces and annealing ovens are equipped with recording instruments which render results definite, determinable, uniform and simple.

In May 1910 (DENTAL COSMOS, August 1910, p. 873) I called the attention of the dental profession to the physical properties of the materials which enter into the casting process as applied to dentistry, pointing out and demonstrating by crude experimentation that pattern waxes (and impression compounds), gold, and investing materials each have individual coefficients of expansion and contraction under varying thermal influence. That paper was followed and supplemented by Dr. Weston A. Price's paper, "The Laws Determining the Behavior of Gold In Fusing and Casting," July 1910 (DENTAL COSMOS, March 1911, p. 265).

Before and since that time (1910) I have been endeavoring to reduce dental

\* A full list of articles by the author on the casting process, with special reference to the Expanded Pattern techniques may be found in the following issues of the DENTAL COSMOS, those of especial interest being indicated by an asterisk: May 1909, p. 546; August 1910, p. 873\*; June 1911, p. 664; October 1911, p. 1109\*; August 1912, p. 890; September 1912, p. 973; March 1919, p. 204\*.



casting to an exact science. Especially to lift dental inlay casting from the mire of guess and inaccuracy to the solid foundation of certainty and precision, and at the same time eliminate, in so far as possible, skill, handicraft, talent, personal equation, etc., thus, by means of *APPLIANCES*, making it possible for any operator in any State or country to do just as *perfect* casting as the most expert technician in the world—and do it regularly! A perfect inlay casting being (briefly) defined thus: A casting of the same marginal dimensions as is the wax pattern when it is in the tooth cavity in the mouth.

Over ten years of intensive, persistent, and more or less continuous research, investigation, and development along the same line usually leads to advancement, and while this advancement would undoubtedly have been far more rapid and certain if hearty coöperation of the Research Institute of the National Dental Association and the profession in general had been accorded, sufficient progress has been made to justify offering at this time, for the consideration of the dental profession in particular and science in general, a casting machine which, it is assumed, is built and operated upon the principle of exactitude automatically executed.

The present paper, in conjunction with my other papers on dental casting, assumes that dental inlay casting is both an art and a science: Art in so far as carving, contouring, and polishing the wax pattern; science regulating the manner or method of manipulating and treating the materials used.

#### WAX PATTERN MAKING.

Pattern making is, in general, the most difficult part in the cast inlay process, but since we have fully covered it in former papers it will suffice now simply to state: Procure a perfect wax pattern of *non-plastic* wax, preferably by means of the wax tray method, and after carving the cavity surface in accordance with requirements invest it at a temperature sufficiently *above* tooth cavity

temperature to compensate for the shrinkage in the gold which is in excess of any change in the mold at the time the cast is made. Of course, the investing must be done in an investing standardizer (see *DENTAL COSMOS*, October 1911, p. 1109, and March 1919, p. 204). After the investment hardens, the flask is transferred to the Electro-Pneumatic Casting Machine, this being the title of the paper and a new device we shall endeavor to describe and demonstrate fully.

#### THE ELECTRO-PNEUMATIC MACHINE.

With all prior appliances there is no means of knowing, or even approximately guessing, the temperature at which the investment is dried-out, the wax burned-out, and of the mold at the moment the gold is cast into it. With the Electro-Pneumatic these temperatures are known and are under the control or the will of the operator, thus materially simplifying the casting process since any number of castings may be executed under essentially the same temperature conditions. All of which is made clear by following *seriatim* the important steps in the investing and casting processes as promulgated by the writer.

The perfect (non-plastic) wax pattern is mounted on the head of the sprue-wire by heating the wire and imbedding it in the pattern, the cavity surface of which must of course be reduced by scraping or carving to within a couple of millimeters of the margins to make room for cement under the body of the subsequent inlay.

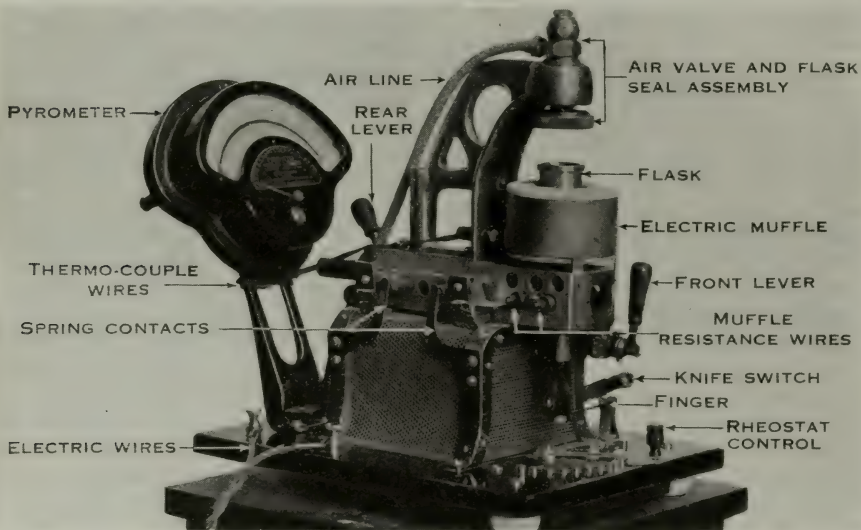
The sprue (by some called a "crucible former") is of special design and construction, consisting of two parts: A wire of suitable diameter and length, and a metal cone with a (vertical) central hole in which the wire slides up or down, thus being adjustable easily and positively to the desired depth the pattern is imbedded in the investing material, and when adjusted it is rigidly held in that relationship by tightening a lock screw conveniently located in the base of the cone. (See Figs. 1 and 2.) The

adjustment having been effected, the investing material is mixed and the pattern coated in the usual manner. The flask is then placed in position, head down, upon the sprue base and filled level-full by pouring the investing material into it, being careful to trap no air, and the base former placed in position by forcing the flange into contact and rotating it, under pressure, upon the base of the flask. The base former and the flask seat in the casting machine are of the same

wiped clean by rotating on the palm of the hand, placed upon the flask seat in the casting machine and lowered into the electric muffle by turning the front lever anti-clockwise; the electric circuit is then completed by closing the knife-switch, the rheostat control lever being on contact 1.

The muffle is wound for 110 to 120 volts, and the rheostat will give any required control within that range, but voltage is *not* always regular or constant.

FIG. 1.



dimensions, consequently the base former must be positively seated.

The flask, with its contained invested wax pattern, is then immediately placed in the investing standardizer which, of course, is at the desired temperature, where it must remain until the investment is fully set—about thirty minutes. It is then removed; the base former is rotated and withdrawn; the lock screw loosened and the cone rotated and withdrawn vertically from the flask and wire; the wire is then heated sufficiently to soften the wax which immediately surrounds it, grasped with flat-nosed pliers and, with a twist, pulled vertically out. The head and base of the flask is then

For example: This machine has been operated successfully on voltage varying from 102 to 125; hence, since a given voltage flowing through a given resistance for a given time produces a given temperature, it is important that we know the voltage or what the effect will be at the time the operation is in progress. This is easily determined (in the absence of a voltmeter, which is not essential) in the following way:

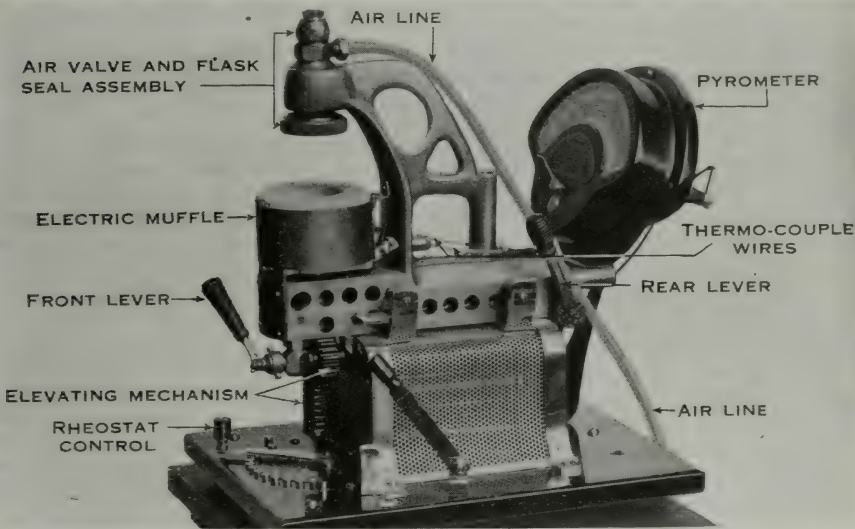
Set an interval timer to alarm in five minutes and immediately close the knife-switch. If, in the first five minutes the pyrometer registers  $400^{\circ}$  to  $420^{\circ}$ , we know that the voltage is around 108 to 110, and the rheostat control lever should



be stepped up to contact 2 or 3. If, however, the pyrometer should register around  $470^{\circ}$ , the rheostat control remains on contact 1. Having thus determined the proper rheostat contact, or resistance, the interval timer is reset for twenty-five minutes, at the expiration of which time—thirty minutes in all—the pyrometer should register around  $600^{\circ}$ ; the temperature recorded at this time, as before, determines the contact to step to, which will be, probably, con-

total time elapsed forty minutes), the wax will begin to burn and smoke issue through the vent in the muffle cover. It takes ten to fifteen minutes to dissipate the average size wax pattern; so, when the alarm (which has been set for fifteen minutes) sounds, it will be observed that the pyrometer registers  $920^{\circ}$  to  $960^{\circ}$  and that no smoke issues through the vent in the muffle cover. The given quantity of gold is then placed in the ingate (by some called the "crucible"), the muffle

FIG. 2.



tact 3, 5, 7 or 9—the lower the voltage the less the rheostat resistance required. After determining the proper contact, move the control lever up to it and reset the interval timer for ten minutes. When the alarm sounds, it will be observed that the pyrometer registers around  $800^{\circ}$  and that the investment is bone-dry—forty minutes in all having elapsed.

The muffle opening is now closed by means of the portable cover, the control lever again stepped up to the proper contact—10, 9 or 7—and the interval timer reset for fifteen minutes. Shortly after the muffle opening is closed (the temperature being around  $800^{\circ}$  and the

opening recovered, and the temperature raised, if not already so, to the desired degree. During the interval of raising the temperature to the desired degree, everything is made ready for the casting operation.

When the desired temperature is recorded, the cover is removed from the muffle opening and the oxy-hydrogen jet applied directly on the gold in the ingate for a given length of time. Under an oxy-hydrogen flame gold undergoes a change of state from solid to fusion to liquefaction and, finally, volatilization. At the moment the gold (in the ingate) assumes a globular form, the flask is raised out of the muffle about one-half



inch by turning the lever at the front of the machine clockwise, thus automatically opening the knife-switch and cutting off the current, the flame being kept continuously upon the gold, which soon reaches the desired state of liquefaction, at which time clockwise turning of the front lever is continued until the *bead* on the head of the flask contacts with the flask seal (which is a part of the compressed air valve assembly) and the moving parts are automatically locked. The action and timing are such that when the flask *contacts* with the flask seal, the seal, the flask, and the flask seat are raised against *light* spring pressure with the result that *first* contact merely *closes* the flask this step being immediately followed by the automatic opening of the (compressed) air valve and the locking of the moving parts; these three operations, in conjunction with forcing the gold into the mold, being, *in effect*, instantaneous.

#### AFTER CASTING.

After the gold in the mold crystallizes, the flask is released by turning the rear lever clockwise as far as it will go and, while holding it in that position, turning the front lever anti-clockwise, thus lowering the flask to the desired position and automatically closing the air valve. The flask is then removed with ease from the machine; the casting removed from the flask, washed, placed in hydrofluoric acid for at least ten minutes, again washed, boiled in an antacid solution, washed, dried, examined under a magnifying glass, any nodules "snipped" off, the surplus (riser) cut off, smoothed with a disk, the entire approximal, if it have such, surface is thoroughly burnished to within a couple of millimeters of the margins, and it is ready for cementing in the cavity.

#### PROGNOSTICATION.

In 1908 I had this to say (DENTAL COSMOS, May 1909, p. 549):

At present our work in this field is largely empirical; we have not practiced casting suffi-

ciently long to have established it on a scientific basis, consequently we are too many times between the devil and the azure brine to know the how and the why. Some day the clouds will clear, and we shall broaden our horizon and place casting on a scientific basis. Then we shall have what we have not now, a perfect casting machine, a machine which will be automatic in its action, indicating the exact pressure on the gold in the mold and at the same time the temperature of the metal, just as our pyrometer [equipped] furnaces indicate the temperature of the porcelain. This together with a perfect pattern wax and a perfect investing material will have a powerful influence in eliminating stumbling-blocks in the paths of those not especially adapted or reasonably versatile.

Ten years later we find this item by the author in *Dental Items of Interest* (May 1919, p. 350):

Success, usually, is dependent upon: Knowing . . . . foundation principles . . . . , plus requisite appliances, plus ability to execute. We inlay technicians have, at present, but one of these, *viz.*, ability to execute—and *that is the least important of all*. For, success (accuracy in marginal continuity) in the cast inlay . . . is, in my humble judgment, vastly more dependent upon *knowledge* and *appliances*, than upon *skill* . . . . The only skill required in a *well-regulated* cast gold inlay process would be in cavity formation and in pattern making. A mediocre freshman can do the rest—and do it better than it can possibly be done today by the most talented technician—*IF* he (the amateur) *be given* charts which show accurately and lucidly the physical behavior of the materials when used in accordance with a scientific technic, and has access to appliances by which he can, with mathematical exactness and mechanical positiveness, control—in *effect*—the physical behavior of those materials.

I believe, and quite firmly, that it is not beyond the pale of possibility to so *harness* the casting process that it will be reduced, at least *relatively* or *comparatively*, to an exact science. I am *convinced* that the present *minimum* shrinkage of about three per cent. linear (nine per cent. volume), which obtains in *all cold investing cold mold* casting techniques when applied to practical work in the mouth (molar-bicuspid region), can *safely* (note, safely) be reduced to about one-half per cent. linear (one and five-tenths per cent. volume)—possibly more, if the casting fraternity, or the members thereof who have the

courage of their convictions, *will get together and dig down to rock bottom*. In other words, place the moot points, the unsettled casting problems in the hands of *competent physicists* . . . with instructions to produce authoritative truth and accurate data—no matter what such scientific investigation reveals as to possible *inefficiency* of present casting technics and appliances—*my own included!*—to produce a casting of the same size as the wax pattern when in a tooth cavity in the mouth.

Parenthetically, Has a proposition of that nature ever emanated from any *cold* investing *cold mold* casting advocate? And if not, why not?

#### A BIT OF CASTING HISTORY.

My first casting machine consisted of a tin ointment-box cover nailed to the end of a stick, a No. 13 S. S. W. Bunsen burner upon which was fixed a brass flask seat and a gas blow-pipe. This machine was used prior to 1908, its principal function being to establish two principles: (1) That dental casting, by a technique which I had *theoretically* perfected, was possible, and (2) that maintaining a hot mold up to the moment the gold is cast into it is not only desirable, but a scientific proposition.

The second machine was a slight improvement. The third was more elaborate and more reliable owing to its *mechanical* construction, though the same Bunsen and flask seat were used. This machine was publicly demonstrated before the Lycoming Dental Society in 1908.

The fourth machine consisted of a No. 13 S. S. W. Bunsen burner and a special flask seat and tube attached to the Elgin vacuum machine. This machine was used regularly in my practice up to the time of perfecting the Electro-Pneumatic which was conceived over ten years ago and born on November 22, 1919.

#### FOUNDATION PRINCIPLE.

The Electro-Pneumatic is founded upon the same principle as was my first casting machine, but by virtue of its mechanical construction, positive temperature records, automatic action, and

fool-proof operation reduces dental casting to a positive proposition—relatively an exact science when used in conjunction with the wax tray method, the expanded pattern technique, and materials of *known physical properties*. With this equipment and knowledge, dental inlay castings of known dimensions can regularly be produced by any average operator; failure being confined almost entirely to the ability of the investment to withstand the necessary forces imposed without cracking.

#### CRACKED INVESTMENT.

Cracked investment results, wholly I believe where good material is used, from *internal* pressure which is of two sources: (1) During the drying-out and burning-out process if too much heat is used or too quickly done; (2) Too much force in driving the liquid gold into the mold. Experience seems to indicate that it is unwise to rush either the drying-out or burning-out processes, or to use excessive pressure in casting.

The flask seat in the Electro-Pneumatic is designed and constructed to relieve internal pressures, it being thoroughly *vented* in conjunction with a *porous insert*, but no amount of venting will wholly compensate for haste or heedlessness. It must be remembered that investing material of the present is fragile, and especially so when passed through the heat, which is absolutely necessary to dissipate the wax pattern—no difference what casting technique be used.

#### DEVELOPMENTAL FEATURES.

In developing the Electro-Pneumatic, the paramount consideration was to make it fool-proof through automatic action and positive control, and if failures did creep in they would in no way put the machine itself out of commission. Personally, I am not smart enough or sufficiently “nifty” to continuously operate a casting machine successfully which requires special fitness in its operative procedure. Personal equation with me is, seemingly, largely confined to my



cranium. With former machines I was in the habit of developing periodically a case of megaloccephalia through a series of successful operations, but each time was forced, by a glaring failure of some description, to flatly admit that, *in my case at least*, it requires something more than acquired dexterity to regularly produce a given result under conditions where skill was the main attribute. Hence the Electro-Pneumatic, which, however, is not to be considered as "the panacea for all casting ills," for it is simply a common-sense machine founded upon common-sense principles and requires common sense in its operation. Each important step is definite, determinable, and under the control or the will of the operator without imposing nervous strain or consuming undue energy (physical or mental), thus reducing dental casting to relatively a simple though accurate process. Knowing, I believe, is decidedly more conducive to continuous success than guessing.

The Electro-Pneumatic is neither established nor operated upon a *guess* basis! Furthermore, it is a simple, rugged machine, not liable to get out of order, and requiring little attention to keep in perfect working condition. This machine was operated *intermittently* from November 22, 1919, to February 22, 1920, without applying any oil to a moving part, and it was still working perfectly though the elevating mechanism was getting a bit "rough." In that time it had passed through seventy heating operations and executed fifty castings, not to mention the numerous times it was operated mechanically just for the fun "of seeing the wheels go round."

#### CONCLUSION.

I have called attention to the present status of industrial casting, etc. You who have given the question of dental

inlay casting any serious consideration at all, know full well that it is impossible to make a casting of the same marginal dimensions as the wax pattern when it is in a tooth cavity in the mouth, unless we take full cognizance and advantage of temperature conditions and the behavior of the materials used. Since this is a fact, and in view of the further fact that industrial concerns universally are reducing their mechanical processes, in so far as possible, to an exact science, it seems to me that the dental profession should be content with nothing but the most perfect processes where tooth conservation is the vital question involved, and that said processes should become established *only through the full indorsement of competent, disinterested physicists!*

At present all our casting processes—*my own included!*—are, more or less, conspicuously garbed in diaphanous garments: Empiricism, Camouflage, Ostentation. I hold that we (the dental profession) are an insignificant part of the so-called "healing art" if we fail in placing our mechanical procedures and physical processes on a plane *at least* on a level with industrial concerns!

Owing to the fact that I have neither the equipment for nor access to a research laboratory of the nature indicated, I wish again to emphasize that I do not claim absolutely to have reduced all phases of the dental casting process to an exact science, but *believe* that a permanent foundation has been established for such procedure. Knowing the exact expansion and contraction of the materials used when passing through the various temperatures indicated, our casting problems, in so far as shrinkage is concerned, become solvable through mathematical calculation, thence heat regulation by means of the appliances which have been described in this and former papers.



# The Present-Day Tendencies of Dental Practice.

By L. PIERCE ANTHONY, D.D.S., Philadelphia, Pa.

(Read before the Maryland State Dental Association, Baltimore, Md., June 22, 1920.)

THE world-wide spirit of unrest and discontent as the resultant aftermath of the recent war, or as one writer has termed it, the moral shell shock from which the social world is suffering, has very perceptibly affected the world of dentistry and has been expressed in a demand for a general dental house-cleaning. The reaction of the dental profession has been a forcible realization of the necessity of the adoption of methods of practice which will more nearly meet the increasing demands upon dentistry, and the most hopeful direction seems to be that of prevention.

We have for many decades been endeavoring to impress upon the medical profession and the public the importance of the oral cavity as a factor in bodily health and disease and to convince them of the latent potentialities for evil that the oral cavity harbors. The mouth cavity has at last received full recognition as an important, if not *the most* important, organ of the body in the life process and in many cases its finality—death. It was not, however, until the radiograph came to be generally applied to dental practice that such recognition came, and the impetus it has received, through the medical profession and the public, was so overwhelming that at one time it threatened calamity to the dental profession. Indeed that time is so recent that we have not yet entirely recovered our equilibrium.

## RADICALISM.

From absolute disregard of the human mouth as a factor in bodily disease to

considering it the most potent factor in the causation of all bodily ills would seem to be a giant's stride, but it is one which the medical profession can and did make with greatest ease. In fact, the medical profession has been notoriously facile in its chameleon-like changes from one fad to another for many centuries. It is prolific in fads which soon pass into the oblivion they deserve, and herein is the hope of the future in our present newly-developed relationship to our mother profession. The medical profession, we feel, is unquestionably equal to the task of retracing its extreme radical steps toward the elimination of all diseased dental conditions to a safe and sane ground. Indeed we are happy to see that some of the leading medical men have already seen the dangerous extreme toward which they were tending and have called a halt, and are now in a mood to concede the claims of the more conservative element of dentistry. This is as it should be, for if the focal oral infection tide had continued to swell we should soon have become a toothless race. The physiologic function of the mouth and teeth as the first and one of the most important of the organs taking part in the process of digestion seemed to have been entirely disregarded and our path of vision to the ideal in dentistry seemed hopelessly obscured.

The opprobrium of such radicalism is not all upon the medical profession; some members of the dental profession have gone to as great extremes as the medical profession and some are still exhibiting hysterical symptoms of radicalism, one prominent English dentist having gone

to the absurd extreme of extracting all of the teeth of one of his young children in the hope of avoiding all the numerous evils which have been attributed to focal infection in the oral cavity.

Thus we see that the tendency to fadism is as pronounced in the dental profession as in the medical, and as long ago as 1882 the well-known Dr. Welch, then the editor of *Items of Interest*, in commenting on this tendency likened the dental profession to Barnum's elephant on a see-saw: "His anxiety to get to the extreme height of the plank makes him pass the center, when he finds himself suddenly brought to the ground. Though he often repeats his experiment he is seldom content with the most elevated position attainable—the center." However, 'tis an ill wind that blows no good, and the beneficial result of our most recent fetish has been to awaken the dental profession to the sins of commission and omission in the past and to arouse in all ranks the desire to improve the methods of practice so that we may creditably perform the mission of dentistry, namely, to save teeth rather than extract them.

#### THE RADIOGRAPH.

Much of the radicalism above referred to has come from a misinterpretation of radiographic findings, and this valuable addition to our practice will eventually, we feel, prove to be one of the greatest advances made in many decades past. When we have arrived at the point where we can properly interpret our findings we do not believe they will point, as some seem to think at present, inevitably to the removal of every affected tooth. Too much reliance is being placed upon the X-ray film and its interpretation as the final diagnosis of all cases. It will eventually prove an invaluable adjunct to dental practice, but it will be as a diagnostic aid to clinical manifestations.

The medical profession has challenged us to make the next greatest step in preventive medicine; we are taking that step and the public is impatiently awaiting the result. We cannot make the step

successfully though, without the co-operative aid of the medical profession. Mayo says the trend of modern medicine and dentistry is bringing their fields more closely together. The recent war was undoubtedly a means to this desirable end, but more recently this coöperation in some quarters has been more apparent than real.

#### CROWN AND BRIDGE WORK.

The present system, or rather lack of system, in the practice of crown and bridge work seems to have received more censure than any other phase of practice, but we believe the greatest fault lies in treatment and filling of root canals, crown and bridge work being only the avenue of expression of the evils of faulty root-canal work, and when we have arrived at a definitely standardized and reliable procedure for filling root canals, bridge work will become a safe and reliable means of restoration.

Efforts individual and collective have been exerted toward the solution of many of our problems and, while the results have not been all that we could wish, much progress is being recorded. Research work is being conducted under the auspices of the National Dental Association, but in the anxiety to produce immediate results much confusion has arisen and much effort has been misdirected. It seems that the most valuable research work that has been done in dentistry has been in the individual efforts of men qualified for such work and possessing the scientific sense—if we may so term it.

#### ROOT-CANAL WORK.

The root-canal problem, the *bête noir* of dental practice, is being attacked from many angles with considerable success, and the profession has realized that success in this field involves the same factors as in almost all phases of dentistry, namely, highly skilled individual technique aided by strict surgical aseptic procedure. Many ingenious methods and procedures have been devised to obviate



the necessity of pulp devitalization, in the form of inlays, clasps, etc., as attachments for bridge work, but at best this is merely temporizing with the situation in an effort to postpone the evil day when more of the teeth will be lost.

The cumulative result of our experiences and observations in the past, however, is that our problem can only be rationally solved through the means of prevention—prevention of caries and its consequent chain of evils through intelligently applied prophylactic measures. And to this end the profession is rapidly coming to a realization of the great assistance that may be derived from the intelligent aid of the dental hygienist. The latter will enable the dentist to care for a much larger clientele than he could otherwise do and render service to his patients that would entirely meet our present-day conception of preventive dentistry. Indeed, we have almost solved the question of control if not cure of the most prevalent and heretofore most intractable mouth condition—pyorrhea alveolaris—through the intelligent application of prophylactic measures, and in this field we believe the most brilliant results will be derived from the efforts of the dental hygienist in the way of preventive dentistry.

#### PREVENTIVE DENTISTRY.

The profession has long ago come to a realization of the hopelessness of fulfilling its mission through the means of reparative dentistry and is now concentrating its efforts in the direction of prevention. Varied efforts from various quarters are being made to solve the problem of caries causation with some hope of success. Research work in this field is encouraging, and we believe the most promising field of discovery in this

line is in the direction of diet. The character of the saliva undoubtedly has an important bearing on the prevalence of caries, but when the much-discussed question of vitamins is better understood, it will very likely throw light on caries causation.

The greatest difficulty the profession has to deal with is lack of interest in research. The average dentist is so busily engaged in practice that he has little inclination in this direction, and for this the conditions under which he works are largely to blame.

Dentistry is a profession that makes enormous demands on the nervous energy and is becoming more difficult each year. The field is broadening and has become so large that it is fast developing by force of necessity into specialized branches and herein lies the hope for increased technical skill. The orthodontist has shown the way and when we have highly skilled specialists in root-canal technique, crown and bridge work, and other branches, we shall in all probability be able to handle the various phases of dentistry as successfully as the orthodontist handles his special phase.

It may appear to some that the writer has drifted far from his subject, but to sum up his impression of the present-day tendencies in dental practice he would say that the tendency is unmistakably in the direction of perfection of technical skill intelligently applied, with a full knowledge and understanding of clinical conditions evolved through scientific research and clinical experience, and toward rationalism in the practice of preventive dentistry as the only hope of properly fulfilling the humanitarian mission of dentistry as a branch, and a most important one, of the great healing art.

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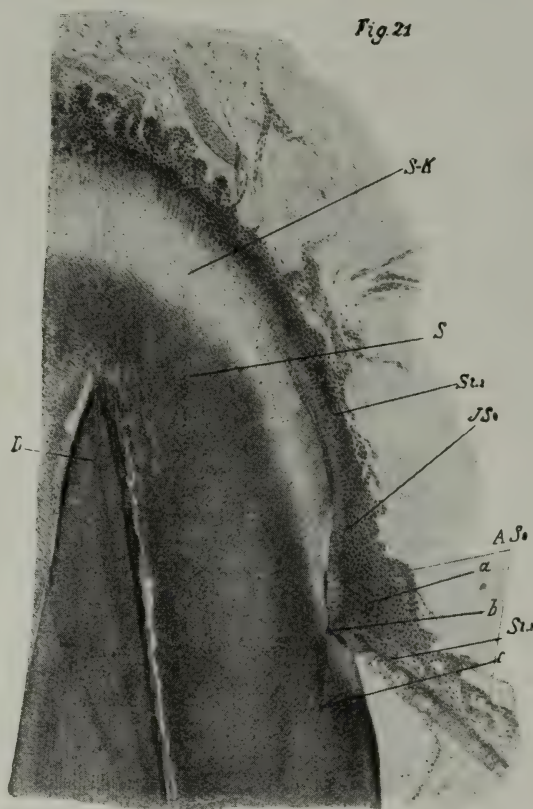
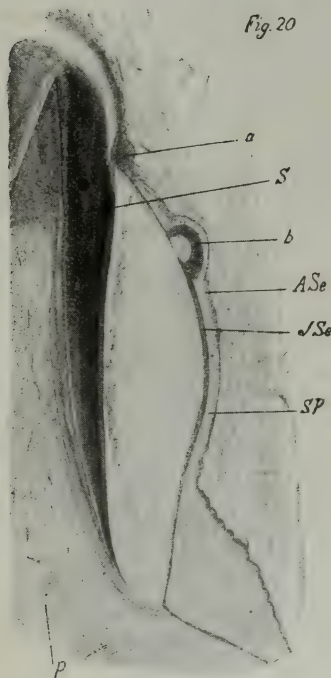
## Rachitis and Enamel Hypoplasia.

By Dr. B. GOTTLIEB, Vienna, Austria.

(Continued from page 1221.)

In specimen Fig. 3 we mentioned the manifestations which were possibly due to syphilis. The appearance of this

ical): Acute rachitis. We are dealing here with a case which came *ad exitum* not long after the formation of the hy-



specimen does not in any way distinguish itself from other pictures.

Specimen shown in Figs. 20 to 25 comes from a child, fourteen months old. Diagnosis (both clinical and anatom-

poplasia. In Fig. 21 we see at *S* calcified enamel and above it at *S-K* a layer of non-calcified enamel. There is a hypoplasia at *b*, from which the line of injury runs toward *c* (Zsigmondy). On

the surface of the enamel a short strong colored streak can be traced from *b* toward both sides. The enamel epithelium shows perhaps on both sides of *b* signs of degeneration; at *b* itself there is an absolute normal aspect just as above the badly calcified enamel. Only at the extreme edge can be noticed displace-

easily explain the condition in Figs. 2 and 5, where these swellings are much larger. We can establish beyond any doubt that both swellings do not consist of enamel cells, but consist exclusively of cells of the stratum intermedium. These proliferations are, as mentioned above, not identical with the displacement of

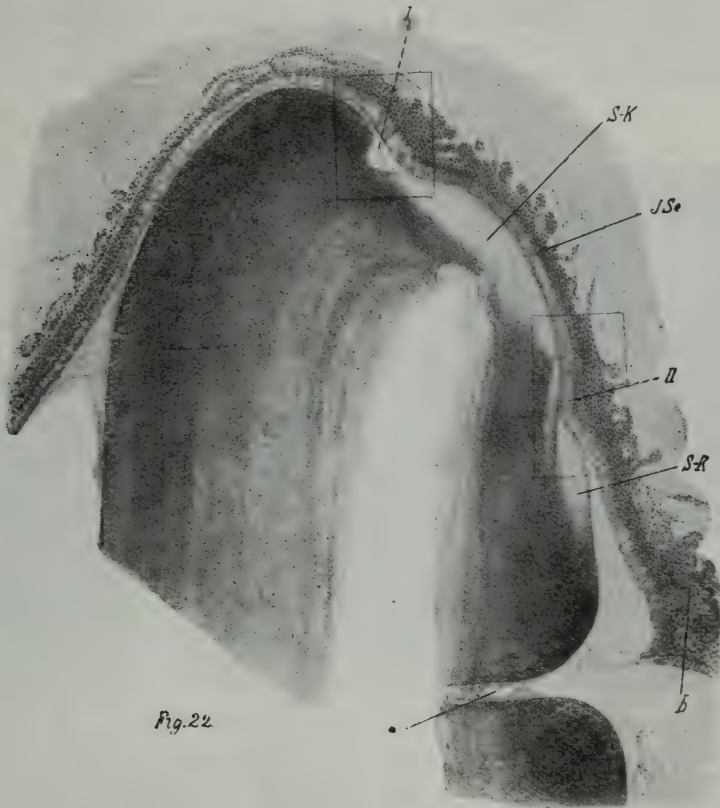


Fig. 22

ments and greater degeneration. Particularly noticeable is the proliferation of the stratum intermedium at the hypoplasia (*a*). In the survey picture (Fig. 20) we notice lower down a similar proliferation of semi-circular shape (*b*), which represents the continuation of the same formation (*b*) from the adjoining section (Fig. 22). The center of these cells is evidently already degenerated and decayed, causing a semi-circular swelling. The rudimentary phases will

the epithelium and the formation of folds in the specimen shown in Figs. 7 to 14.

In the last-mentioned specimens the stratum intermedium and the enamel cells have been raised in folds, while in this case (Fig. 20) the enamel epithelium is in fairly good condition. The displacement which can be seen in the pictures of the specimen shown in Figs. 20 to 25 is post-mortem, as the cavity appears empty. In the semi-globular protuberance *b* (Fig. 20) the enamel



epithelium continues in one row under it and shows in Fig. 20 a defect only in the middle. In Fig. 22 we notice a contraction only toward the narrow, far extending hypoplasia (*a*).

In Fig. 22 *I* an enamel defect is bridged over by a crumbled, unilateral enamel epithelium. The enamel epithelium does not differ from the adjacent ones. When largely magnified (Fig. 23) we find in the defect streaks of non-calcified rods, which can be traced right into the calcified layer. From this ex-



Fig. 23

Fig. 25 represents a tangential section of the same specimen. The hypoplasia pointed out in the previous figure can be noticed here more clearly. At *b* the line of injury goes right across. The enamel epithelium suffered most here. Normal epithelium appears only on the slanting parts on both sides. At *a* and *b* we notice defectively calcified enamel, at *c* a cavity, in which appear insignificant streaks of non-calcified enamel. The cavity in Fig. 22 terminates in the defect at *I*. There can be no doubt that



Fig. 24

ample it can be seen most clearly that the primary event is the defective deposition of lime.

At the enamel hypoplasia of Fig. 24 we notice normal conditions of the epithelium. The enamel rods, however, run in different directions on both sides of the line of injury; in the zone which was formed latest, the enamel is defectively calcified. In survey picture (Fig. 22) the enamel hypoplasia (*a*) requires some explanation. It has no connection whatever with the large space of interrupted calcification on the edge. The localization and the extent toward the depth would justify this conclusion. It is, however, not impossible that it is a foramen cecum.

this delicate structure described above filled *intra vitam* the whole cavity, as the enamel epithelium is maintained *in situ*. If the tooth appears at this stage, then the whole soft structure falls off and the defect remains.

On the left-hand side below the break *b* (Fig. 25) toward the root there is another defect (*x*), while the corresponding place on the other side (*S-K*) appears well formed, but defectively calcified.

In Fig. 26 we have the longitudinal grinding of a canine tooth with numerous zonular hypoplasia and the corresponding series of interglobular spaces.

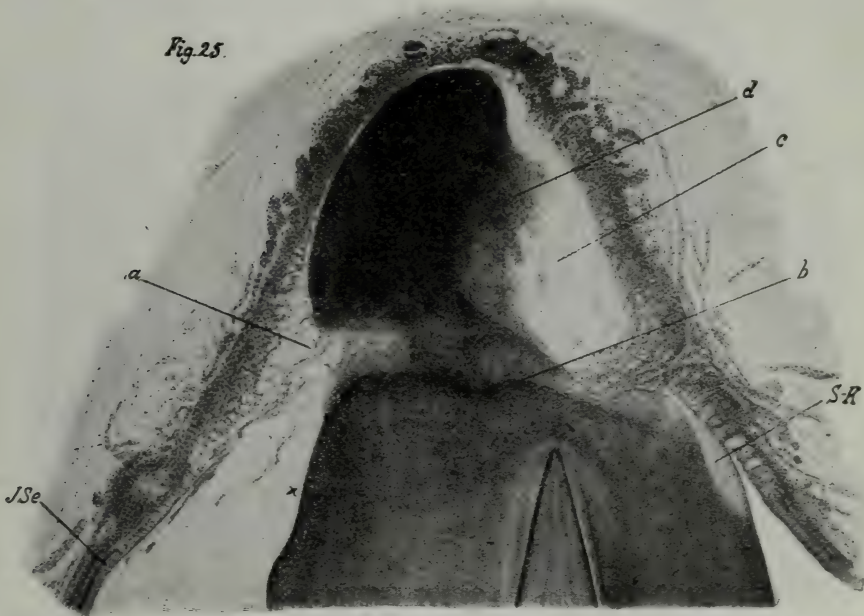
In Fig. 27 we have a hypoplasia with the corresponding interglobular space



greatly magnified. The rods on both sides of the line of injury run in different directions. In the interglobular spaces the dentin channels go through without interruptions. While the cause of the pathological appearance of the completed dentin is undoubtedly the defective calcification, conditions in the enamel are much more complicated. In the course of the line of injury an inflection of the rods takes place; we can

tributed on one level round about the tooth; frequently we find altogether only one or two lacunæ interrupted by enamel which appears quite normal both in shape and color.

If, owing to disturbances in the internal secretion, the injury to the epithelium which forms the enamel were the primary reason, then a ring-shaped hypoplasia would appear in each case; it is not likely that a satisfactory answer



always notice a dark line which is full of inorganic substance. We have here the place of the inflection of the rods, the crumbling of the defectively calcified parts, as shown already by Berten.

On the basis of both literature and the results of our own researches, and also the clinical facts we shall try to draw a uniform picture. The question now is: *Is the primary disturbance in the deposition of lime as in dentin and bone, or in the epithelium?*

We know first of all that the enamel hypoplasia of human teeth are very rarely annular defects of equal depth. The interruption of the development produces mostly lacunæ, which are dis-

tributed on one level round about the tooth; frequently we find altogether only one or two lacunæ interrupted by enamel which appears quite normal both in shape and color. If, owing to disturbances in the internal secretion, the injury to the epithelium which forms the enamel were the primary reason, then a ring-shaped hypoplasia would appear in each case; it is not likely that a satisfactory answer

should be found why in one case all cells should be affected, while in others only some cells suffer, leaving adjacent cells of the same phase of development unaffected. If we assume, however, that for no reason whatever only some cells should be affected, then the zone-like arrangement becomes inexplicable. The enamel is formed according to the lines of Retzius in a fairly broad zone. There are other ameloblasts besides toward the root in a fairly broad line ready to start at the right moment one after the other to produce enamel. If we had to deal with a primary injury of the epithelium by disturbances of metabolism or by bacteria in a given phase of development,

*e. g.*, the time when the edge of the crown is formed, then a fairly broad streak of ameloblasts, about half the length of the future crown, would be liable to injury. Though we may assume, that all cells need not always be destroyed, yet *the distribution would be without order* as we know from other organs, *e. g.*, the liver, and not as here on a horizontal level.

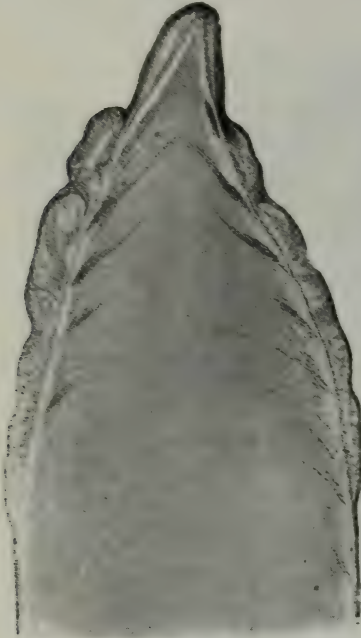


Fig. 26

There are many teeth with such a quantity of hypoplasia (wavy enamel as in the picture of the grinding), that at first sight the impression of an irregular distribution over the whole surface may be created, but even in these folds the horizontal arrangement can be recognized. This zone-like arrangement has always been considered to be the most significant and characteristic symptom. It would then be difficult to explain the shape of the pits with the round corners. If a group of injured ameloblasts stops activity, then the defect thus formed would have partitions which are vertical to the surface of the enamel, but

the hypoplasia have actually round edges.

There is also another circumstance which argues against assuming a primary injury to the ameloblasts by deficiency of the production of enamel. Wherever hypoplasia are formed, there appears a broadened dentinoid, in man and rat alike. In the dentin of completed teeth we find in accordance with the outline, rows of interglobular spaces, zones in which the elementary substance is formed in a normal way, but is de-

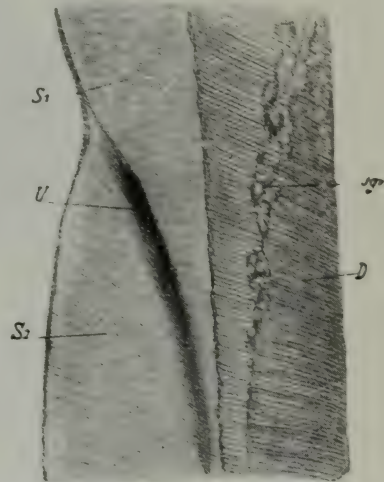


Fig. 27.

fectively calcified. We know further that the similar condition of bone (rachitis) is due primarily to the deficiency of calcification while the elementary substance is still being formed even in increasing quantities. If in other tissues which contain lime, the derangement becomes apparent according to the degree of deposition of lime, then we must assume the same process in the case of enamel, unless we have serious reasons against it and are compelled to seek the explanation of the remarkable final result in the peculiar condition of the tissue.

Berten already pointed out, and I can confirm it (Figs. 24 and 27), that the rods in the zone of the break line under-



went an interruption and that the directions of the rods differ on both sides.

On the basis of these observations Berten came to the only possible conclusion, that these pictures are caused by a collapse of defectively calcified or non-calcified parts of enamel in connection with the enamel cells changing place in the adjacent parts. If it were simply the injury to the ameloblasts owing to which they could not produce enamel substance for a certain time, but would later go on with the production beyond the break line, then it would be quite inconceivable why they should take a different direction immediately when affected by sickness. In parenthesis we may say that we can base this assumption only on internal secretion and not on local injuries by microorganisms.

We see, therefore, that there are many objections against the theory of explaining human hypoplasia by a primary injury of the ameloblasts.

The case of the teeth of rats is identical. Erdheim says; from his parathyroprivia rats: "On the front of the tooth which is covered with enamel appear first of all opaque white spots. The spots move from the basis of the tooth upward toward the edge; other spots follow. The spot may disappear and leave a cavity. It is clear that it can only be a case of defective formation of the enamel."

From this description it is evident that the defectively calcified, but in outward form intact, enamel is a primary phase of the enamel hypoplasia. As the chalky spot, however, shows no change in the volume, the enamel cells must have produced a normal quantity of elementary substance and the primary injury cannot, therefore, be in the enamel cells. When the extra-alveolar chalky spot crumbles to pieces owing to injury and produces a defect, it is very likely that similar intra-alveolar conditions also lead up to the formation of those enamel hypoplasia which leave the alveoli as such. Erdheim and Toyofuku say further that the first change which takes place, as shown by histological research, is the displacement of the enamel epi-

thelium without any changes becoming noticeable in the epithelium cells for the present. Even in their new position the cells continue producing enamel.

This observation also does not speak for a primary injury to the enamel epithelium. The changes in the epithelium cells occur according to these authors at a considerably later phase. The first change of (already five to ten days after extirpation of the epithelium corpuscles) the enamel epithelium being raised from the enamel and putting on folds cannot be taken as proof of a primary injury to the enamel cells, particularly as signs of degeneration appear much later and as the cells form enamel even in their new position.

The pictures in Figs. 7 to 16 show the changes which have been described in the case of rat teeth.

If we wish then to have a clear idea of these processes, first of all we must try to find a satisfactory explanation for the changes in the enamel epithelium (raising and formation of folds) as described by Erdheim.

Erdheim and Toyofuku did not take any notice of the rapidity of growth in teeth of parathyroprivia rats and this is a very important factor for a clear understanding of the changes in question. I pursued my investigation of the parathyroprivia rats as to rapidity of growth compared with control rats with the following results:

First I shall mention my method of measuring dimensions. I made a mark near the border of the gums of the lower incisor teeth (owing to their greater length they are more suitable than the upper ones) with a three-sided square file and noted the distance from the lowest point of the border of the gums. A few days later I measured again. The difference between the two measurements showed the growth of the tooth during the intervening time. When the mark approached the edge of the tooth, a new mark was put on, etc. I measured with the nonius.

I present on the following page tables giving the results of experiments on three rats:



TABLE I.

Change in organ.	Date.	Total growth.	Macroscopical changes and remarks.
Both lobes of the pituitary body excochleated.	22. VIII	—	Enamel dull
	25. VIII	1.6 mm.	
	27. VIII	2.3 mm.	
	30. VIII	4.5 mm.	
	3. IX	5.8 mm.	
	10. IX	7.7 mm.	
	13. IX	8.5 mm.	
	15. IX	8.5 mm.	
	18. IX	8.9 mm.	
	25. IX	9.8 mm.	
	3. X	11.3 mm.	Fresh parts less dull Enamel very dull Right-hand lower tooth broken
	8. X	11.9 mm.	
	16. X	11.9 mm.	
	23. X	13.6 mm.	
	4. XI	All teeth broken	

TABLE II.—EARS INTACT.

Controlled.	Date.	Total growth.	Remarks.
	22. VIII	—	
	25. VIII	1.5 mm.	
	27. VIII	2.7 mm.	
	30. VIII	4.9 mm.	
	3. IX	6.4 mm.	
	10. IX	9.8 mm.	
	13. IX	10.4 mm.	
	15. IX	11.3 mm.	
	18. IX	12.7 mm.	
	25. IX	16.7 mm.	
	3. X	21.0 mm.	
	8. X	22.9 mm.	
	16. X	28.2 mm.	
	23. X	32.5 mm.	
	4. XI	38.4 mm.	

TABLE III.

Change in organ.	Date.	Total growth.	Remarks.
Excochleation probably of both lobes of the pituitary body.	22. VIII	—	Enamel dull
	25. VIII	1.6 mm.	
	27. VIII	2.3 mm.	
	30. VIII	3.7 mm.	
	3. IX	5.3 mm.	
	10. IX	9.0 mm.	
	13. IX	10.8 mm.	
	15. IX	11.5 mm.	
	18. IX	13.1 mm.	
	25. IX	15.9 mm.	
	3. X	21.1 mm.	Enamel normal Teeth broken
	8. X	24.0 mm.	
	16. X		

A comparison of the rapidity of the growth of the rodent tooth of the parathyroprivia animal with the control rat shows an increasing difference, so that after two months the total growth of the normal tooth of 32.5 mm. compares with 13.6 mm. of the parathyroprivia animal.

Interesting are the figures of rat 3 where was registered "probable Excochleation." Up to 3.IX the tendency of growth was even a little slower than with rat 1. At the end of the second week rat 1, and a few days later the control rat, are left behind considerably, reaching on 8.X an advantage of more than 1 mm. over the control rat. The case is not doubtful. There was a remnant left which recovered to full activity after a week. The first dull spot passed the border of the gums between Sept. 15th and 18th; between Sept. 29th and Oct. 3d came again normal enamel and during the week from Oct. 8th to 16th the teeth broke off. The injury which occurred to the parts of the tooth formed during the period between the operation and the regeneration of the epithelial bodies, could not afterwards be repaired again.

If we compare the results of measuring with the histological observations we find a clear connection between the first appearance of slower growth and the lifting of the enamel epithelium and the formation of folds. Toyofuku mentions on the fifth day for the first time the displacement of the enamel epithelium, but he does not yet consider this change as vital, because there are no formed elements in the crack. The next phase which he investigated was the eleventh day, when the vital nature of the displacement became evident. During the first five days the growth of the teeth of operated rats was left behind by 0.4 mm., on the tenth day by 1 mm. The explanation of the displacement and the formation of folds in the enamel epithelium become now fairly clear.

When the disturbance sets in the tooth begins to grow more slowly, as we shall see, owing to the interruption of the deposition of lime; smaller portions are sent beyond the gums, but the enamel

epithelium grows to the same extent as before. The result is an incongruity of the enamel epithelium and its basis. The enamel epithelium is lifted at first in an arch and forms folds afterwards. It is still intact and, therefore, produces even now enamel, which owing to the irregular position of the epithelium is irregular. In the course of its further displacement it suffers and degenerates. The various changes of human teeth were described above in connection with the corresponding pictures.

Erdheim and Toyofuku as a rule speak only of a displacement and the formation folds of the enamel epithelium while the enamel dentin border is described as level. We must come to the conclusion that in most cases the defective calcification of the developed parts of the tooth reacts on the formation of new dentin, which only takes place in proportion as the tooth is pushed forward. The enamel epithelium is not so dependent on the rapidity with which the tooth comes up; it grows on normally and forms folds owing to the deficiency of space on the basis. We see, therefore, that just the enamel epithelium preserves the normal qualities the longest.

Toyofuku mentions, however, that in some cases also the dentinoid which lies below forms folds, which the enamel follows, so that also the enamel-dentin border shows folds. He does not try to explain this observation.

I am showing in Fig. 28 a picture of a tooth of a rat which was used for metabolism experiments, about which I shall report later on. We can see there folds of the newly formed parts as Toyofuku describes them. What in most cases applies to the enamel epithelium alone, applies here to all newly formed parts. These pictures can be explained only by the incongruity of the rapidity of throwing out parts and of developing them.

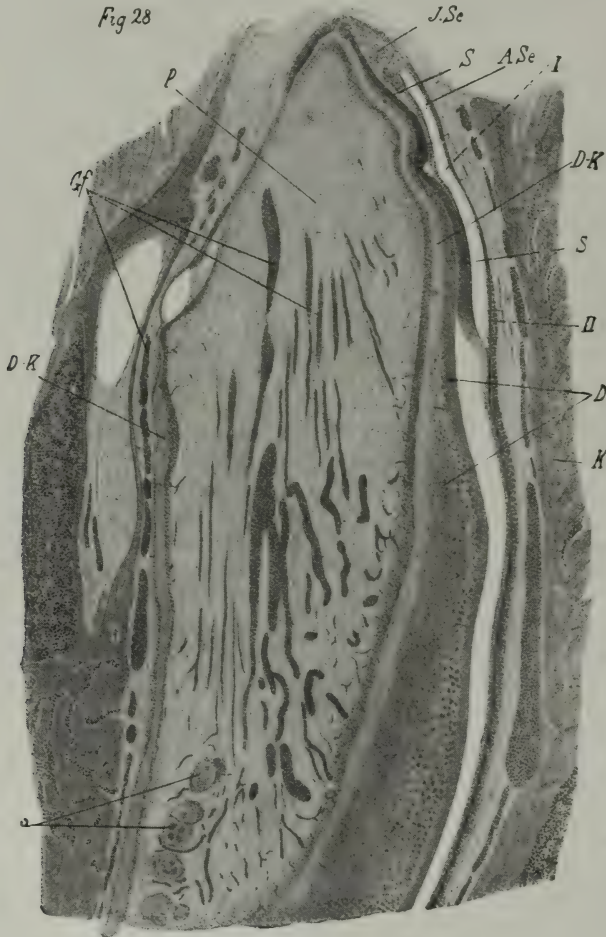
Either parts are thrown out too slowly, while the new formation proceeds normally, and the newly formed part of the tooth must form folds in order to find room in the reduced space, or the throwing off of the developed parts goes

on normally while the new formation is excessive.

In the case of parathyroprivia rats we proved by measurement that the finished parts are pushed on much more slowly. In this case we have to deal with fairly normal conditions of new formation and

tion one case I had recently under observation.

A boy, eleven and one-half years old, had of permanent teeth only  $\frac{6}{6}-\frac{1}{2} \frac{1}{2}-\frac{6}{6}$ , all covered with hypoplasia. This is certainly not the most pronounced case under observation. What is the cause



slower throwing off of the completed parts. It is very likely that many curvatures of the root are due to a similar process.

Of human teeth it has always been known that rachitic teeth appear considerably later, frequently years later, than would be normal. I shall only men-

of the slower appearance of the teeth in parathyroprivia rats and rachitic children? By the preceding remarks a uniform treatment of the two categories will appear justified.

In putting this question we touch difficult ground. I do not wish, however, to go into the literature, as I do not care



to digress from the subject under discussion.

We have seen that with the slower growth of rat teeth in many cases a slower new formation of dentin (never the new formation of the enamel epithelium) keeps pace, but it is not so in all cases. We had to assume a primarily slower pushing off in case of folds in the newly formed dentin which did not depend on the degree of the new formation, in consequence of which the newly formed parts of the tooth must form folds in the reduced space. From these pathological conditions we learn to understand the appearance and the growth of human teeth.

We have here to deal not exclusively with the pushing on of the crown owing to additional growth of the root or the pulp swelling, the *vis a tergo*. *The driving force when the tooth appears is to a large degree due to the effect of the calcified part of the tooth as a foreign body. This effect corresponds to the degree of calcification.* The less calcified a part is, the slower it wears off. The cases of folded dentin and enamel in the new formation zone of the badly calcified rat tooth are in my opinion an indisputable proof of this assumption and I believe it to be more than a mere hypothesis.

We have seen that the interrupted calcification acts somewhat like a self-regulator. The part which the growth of the root plays when the tooth appears is influenced indirectly also by the conditions of calcification.

In order to avoid misunderstandings I want to emphasize that the slower appearance which was observed in case of hypophysis extirpation or may appear in genuine dwarfs is quite different in character. In these cases there is a primary disturbance of the growth of the skeleton, which has nothing to do with calcification. If the teeth appear later, then this retardation corresponds with the slackened pace of development of the individual.

The condition of retained teeth, which owing to wrong conditions do not come out, is quite in accordance with the above

opinion. The teeth are treated as foreign bodies.

We have come to the conclusion that the disturbance in the deposition of lime is the primary cause of enamel hypoplasia, *i.e.*, rachitis in the case of dentin and bone. The final result of this disturbance in enamel is different from the case of dentin and bone, just as we saw it in the decalcification for the purpose of histological researches. As more than 95 per cent. of the enamel is lime, the remainder cannot keep up the form of the whole and crumbles off.

With regard to the etiology we can be brief. I may refer in this respect especially to Erdheim's fundamental researches. We know that tetany is in close connection with deficiency of lime and is always an accompanying symptom of rachitis and osteomalacia. In case of rachitis remissions and relapses are frequent, which may be met also in cases of tetany.

As the hypoplasia is to be only expected in an excessively acute outbreak of metabolism and as in this state the over-irritation will be highest, we must consider the coincidence of hypoplasia and tetany as very likely. In no case can we find any discrepancy of opinion among the adherents of tetany and rachitis etiology.

Other disorders which are made responsible for the existence of enamel hypoplasia are partly such as accompany rachitis or increase it, partly such as have nothing to do with it.

The process of an injury to the tooth germ in case of clear syphilis congenita without rachitis has not been dealt with, as it does not belong to the subject. I may refer in this respect to Walkhoff's writings.

#### SUMMARY.

1. The enamel hypoplasia come as a rule into existence by the crumbling off of normally formed, but defectively calcified or non-calcified, elementary substance. The effect on the disturbance in the deposition of lime (rachitis) is, according to the difference in kind of

tissue, different from the effect on bone and dentin.

2. The different forms of defective enamel calcification, especially chalky enamel, are preliminary phases of enamel hypoplasia.

3. Owing to defective calcification in case of rachitis the appearance of the tooth and as a rule also the formation of new dentin is delayed. The enamel epithelium is hardly delayed in growth; in comparison with the base it becomes too large, is displaced and forms folds. Sometimes even the formation of new dentin does not slacken accordingly, so that it is also obliged to form folds.

4. The cutting of the tooth represents partly the pushing off of a part which owing to continued calcification has become a foreign body to the organism.

5. The degeneration of the ameloblasts occurs comparatively late and is not primary, but is directly or indirectly due to defective deposition of lime.

6. The relation of tetanus or other disorders to enamel hypoplasia can only be explained in their connection with rachitis.

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## Orthodontic Limitations.

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(Read before the Eastern Association of Graduates of the Angle School of Orthodontia, New York, N. Y., May 7, 1920.)

**D**URING the early years of my practice as a specialist in orthodontia I entertained the belief that *ideal occlusion* of the teeth was the normal for every human mouth; and, assuming this ideal to be a sort of perfected part of the great scheme of Nature, every variation from it could and should be successfully corrected. This doctrine was generally accepted by orthodontists, and our practices were shaped accordingly.

We started in with the conviction that we could correct any form of malocclusion the human family could furnish. In our mind's eye we had a picture of the skull known to most of us as *secrctum apertum*, and we meant to make every mouth conform to that picture.

In our earnest enthusiasm we took little thought of the biological fact that every part of every living organism is constantly undergoing more or less variation; that without doubt the function of the human masticatory apparatus has suffered a most marked change through the advent of civilized cookery, and that biologists generally accept the theory that "function is from beginning to end the determining cause of structure." We did not concern ourselves with the thought that we might possibly be operating on a very variable part of the human body, within which there might be hidden forces at work laboring to undo what we were trying to accomplish. And even if this were not so, we gave no consideration to the fact that there is no such thing as perfect symmetry in Nature. It reminds me now of those lines from Thomas Moore,

"Faith, fanatic faith once wedded fast  
To some dear falsehood, hugs it to the last."

I need hardly say that it required only a few years experience in the actual practice of orthodontia to convince many of us of the fallacy of the theory that "ideal" occlusion is "normal" occlusion, or that normal occlusion is a perfected part of the scheme of Nature that remains constant, or that slight variations from this so-called normal should be corrected.

Ideal occlusion is all right as an ideal; but let us call it an ideal. Let us not get it confused with the real, with the practical, with the attainable, with what Dr. LeRoy Johnson has very properly denoted as the "individual normal." *Ideal occlusion* is a picture of perfection and is a beautiful standard to work toward, but in every-day treatment of malocclusion by all the members of this society over a period of years I wonder what proportion of the final results measure up to this standard? In my own experience it would be very far from 100 per cent., and some of the very difficult cases that I have attempted to treat have been among those on which the degree of malocclusion was comparatively slight. I have learned that in orthodontia it is sometimes an unwise waste of energy not to "let well enough alone." For this "well enough" condition may, in many instances, be a practical normal for the individual.

Perhaps the one incident, more than any other, that impelled me to write this paper was a case shown at the meeting



of the American Society of Orthodontists last year by Dr. Milo Hellman. The models were those of an adult male in middle life, with a full set of thirty-two teeth in beautifully efficient occlusion, but which showed a small space between the upper central incisors. An orthodontist visiting Dr. Hellman's office suggested that this case ought to be treated, and for no other but the most trivial cosmetic reason. In my opinion this was an instance of a specialist having lost his sense of relative values by allowing the vision of an ideal to overbalance his good judgment. And there are many such instances in orthodontia of judgment being led astray by zeal toward an ideal.

I was long ago forced to realize, to my great disappointment, my own inability to obtain in many cases what I conceived to be ideal or normal results from my treatment of malocclusion. But in order not to confine the text of this paper to my own experience and my own observations, I called on a few of my confrères to tell me of their experiences.

I wrote asking:

I would like you to tell me frankly about some of your failures in treatment—about some of the cases in which the result was not satisfactory and the failure was not due to lack of coöperation on the part of the patient.

Also, I would like to know with what degree of accuracy you can control the overbite; can you in deep overbite cases, or in open bite cases, always produce and secure permanently just the amount of overbite that you think is proper for each case? Or do you sometimes find cases where you are unable to secure an overbite that would be considered normal for the cusp development of the teeth? Also, in cases where the arches are quite constricted and there is considerable rotation, do you sometimes have difficulty in securing an ideal occlusion that remains ideal three years after all retention is removed?

I take the liberty of quoting from some of the replies received.

I have been hoping to get time to look over my cases, in order to make accurate replies to your questions; but so far have only been

able to glance over them hastily. However, it was sufficient to enable me to say that there have been very few normal occlusions (he means *ideal* occlusions) permanently established, if any.

Probably the greatest cause of discouragement to me has been failure to get the ideal results which I had thought were so easily attainable. I now know that there is great variability in alveolar processes, peridental membranes, osteoblasts, and osteoclasts, in various individuals as also in various parts of the same mouth. I also know that orthodontic force does not always cause the desired tissue development, and that it may cause overdevelopment.

This explains in a measure the difficulty in attaining and retaining the desired occlusal plane, and overbite, though of course there are other factors, such as lack of harmony in the size of the teeth and arches.

I have had less difficulty with close bite than with open bite, but cannot with any "degree of accuracy" control the overbite. Neither can I permanently hold all rotated teeth.

A young woman came to me last week extremely unhappy and discouraged because her orthodontist had not done the things he had promised to do. The overbite was not as great as promised, the median line was not just correct, and her cheeks had not been filled out as she had been given to believe they would be—she even thinks they are worse. Now the occlusion was really greatly improved, and I should call it a very creditable result; but the man had promised too much. In consequence, orthodontia and the orthodontist have been harmed and the patient made unhappy.

I find that there are a great many cases in which I am unable to explain the persistent tendency of the teeth to return to their old positions.

A second letter from the same writer says:

I selected one hundred cases in which the orthodontic limitations seemed quite clear. Of these, twenty-three had pathological conditions of the mandibular or maxillary bones. Twenty-two had alveolar or peridental membrane deficiency, that is, the surrounding tissues would not respond to orthodontic pressure on the teeth. Some of these would not move at all, some would just loosen without causing any alveolar development. Of course I did not include in this hundred cases any

of those numerous ones that just will not "stay put."

A letter from another writer reads:

I will say that in my opinion there are only two causes for failure in the treatment of orthodontic cases; one is failure or impossibility to eliminate the cause, and the other is lack of coöperation on the part of the patient. I have had some cases in which the result was not satisfactory, though the coöperation of the patient was good. I have supposed the result would be permanent because I could not recognize any adverse influences to normal occlusion, but there must have been, because there was a recurrence. The particular case I have in mind was readily put into satisfactory occlusion again and is still under retention.

Cases due to mouth breathing, where lips are left open and the cause of the malocclusion is obvious, are never permanently cured until the mouth breathing is first entirely cured.

With regard to the overbite, it is the most difficult phase of orthodontic treatment in my opinion. I think nearly half of my patients wear a bite plane at some time, or else the bite is open, and to draw the upper and lower teeth into a satisfactory relation, with a normal overbite, is both difficult to do and hard to judge the period of retention required. But here again I feel that restored occlusion depends on restored function. When the cause that interfered with function is completely eliminated, the occlusion will remain practically normal if you have succeeded in making it so. Now, the great difficulty comes in knowing when the cause is eliminated, not only in this type case, but in many others. Sometimes nothing but experiment will show whether retention can be dispensed with or not. It is my belief that nearly all cases, with earnest coöperation on the part of the patient can be overcome, and the cause also eliminated, so that the results will be permanent, but I make it plain to patients that the result will depend on their coöperation and the permanency of it on their faithfulness in carrying out instructions. There are some cases, however, in which we cannot find out all the adverse influences, and we may therefore not succeed as well as could be desired in spite of the efforts of both operator and patient.

You will note that this writer says: "Now, the great difficulty comes in knowing when the cause is eliminated."

In my experience with malocclusion the greatest difficulty in most cases has been in determining *what is the cause* and *how to eliminate it*. Most of these cases present biological problems which involve so many unknown factors that I must candidly admit I have little faith in my own ability to determine their values or their potency.

A reply from a third writer says:

First, in regard to the control of the overbite. Those cases of deep overbite which are not associated with the distal relation of the lower teeth, I have never been able to correct satisfactorily. As long as appliances are in place it is possible to maintain such relation as you wish in regard to the overbite, but when the appliances are removed the teeth always go together again. In the studies I have made of the neuro-muscular mechanism of the mouth it is evident to me that more fundamental factors in the organization of the whole individual are involved in these overbite cases than merely the relation of the occlusal planes of the teeth. I am thoroughly convinced from clinical experience and the study of the laws and principles of science that the deformed dental arch is often merely one expression of a more general abnormality of structure. And the deformity is more evident in the dental arch than other parts of the organism because of the difference in the nature of the tooth forms and immediately associated structures. A disharmony that would not be evident in an organization of muscle, nervous, vascular, and osseous tissue, would be evident if into that organization were parts of a greater degree of difference of susceptibility to developmental influences. Of interest along this line was a remark by Dr. Castle at the Bussy Institute a few years ago. He said that if teeth or structures of like nature were in the human pelvis in the present generation, irregularities would be as evident as they are in the mouth, meaning that the human pelvis is undergoing a process of involution in the same sense as is the masticatory apparatus.

The position taken by many orthodontists that *normal* is synonymous with *ideal* or *perfection* is of course unwarranted.

A fourth correspondent says:

When you write to me in regard to failures in orthodontia, you certainly are making application at the right "shop." If you care to call, we could show you failures in all the



latest styles, from Class I to Class IV, with all intermediate divisions and subdivisions. When you ask: "Can you in deep overbite cases or in open bite cases always produce and secure permanently just the amount of overbite that you think is proper for each case?" you are asking a question that is awfully easy to answer, and the answer is "No." If you get an affirmative answer to this question from anyone, will you kindly let me have his address because I would be glad to know of someone to whom I could refer certain cases with certainty as to results.

In regard to the so-called open bite cases, I have succeeded in closing an exceedingly wide open bite in the anterior region and have had the gratification to see it remain as left after correction. I have always attributed this particular success to the fact that the work was done exceedingly slowly. I think five years were consumed and as an evidence of the efficacy of slow treatment in such cases, I may add that no retainers were ever used which had any element of retaining the closure of the bite. On the other hand, I have had numerous cases of exceedingly slight open bite and even of edge-to-edge anterior occlusion in which I never did succeed in obtaining an overbite.

In regard to the correction of deep overbite cases, in my experience success, when it comes at all, has been exceedingly easy to obtain. The use of a bite plane of some kind which will prevent the closure of posterior teeth will permit the elongation of the posterior teeth and the correction of the deep anterior overbite, provided Nature is on your side. In other words, if space is provided for growth of the posterior teeth and the teeth grow up, the case is permanently cured.

I have never succeeded in lifting them up and I have seen cases where other men have lifted them up, but they have almost invariably settled down again. I hear men say they can extrude teeth and I hear men say they can depress teeth, yet these same men when they do this accidentally in cases where they do not want it to occur, always inform the patient that "just as soon as the appliance is taken off, these teeth will return to their normal length." Why this should take place in the accidental cases and not in the intentional cases has always passed my comprehension.

If you care to have my opinion as to why we have recurrence of malocclusion years after treatment, I am willing to venture two theories:

In the first place, I believe the present-day

orthodontists have been in error in their methods of determining just what individual normal occlusion should be and I believe most of the so-called methods of arriving at definite conclusions upon which to base treatment have been more or less delusive. I believe also that the following could be set down as an absolute dogma:

There is only one arch form into which a given set of teeth can be arranged to produce individual normal occlusion. This arch form is absolutely determined by the size and shape of all the teeth and by the height and angles of the inclined planes. There is probably only one method of determining the individual normal and that, unfortunately, necessitates the presence of all, or nearly all, of the permanent teeth. If perfect models of a set of teeth could be obtained and placed on an articulator in their maloccluded position, this would give you the relation of the teeth to the jaws as you find them. If all of these plaster teeth are then carefully sawed off the models and then rearranged just as we would artificial or porcelain teeth, and if they are set up with due regard for their size and their occlusal planes, you would have in my opinion the one and only possible guide to the other position which these teeth should occupy with the highest efficiency. If then you can move the teeth exactly into these positions, retention would be necessary only long enough for the arch's tissues to harden. *That this could be done in extreme cases is scarcely credible.* (Italics mine. AUTHOR.)

Second theory. Another important and much-overlooked factor in the retention of corrected malocclusion is the influence exerted by the eruption of the second and third permanent molars. Orthodontists frequently give estimates, move teeth into apparently good positions, and collect their bills. Presently come second permanent molars and everything is disrupted. The teeth are then re-regulated because of the contract. Two or three years later, the third molars erupt and a disarrangement of the arches reoccurs. Fortunately by this time the patient is out in society, if a girl, or engaged in business, if a man, and he has "had enough of regulating teeth." Fortunately also, for the peace of mind of the orthodontist, these failures do not come home to roost.

But one came home to me recently after some seven years' absence from the office. Going back to my cabinet, I found that I had moved these teeth (Class I case) into good arch alignment so that they "looked" very well, looked so well in fact, that the bill was paid



cheerfully. But to do this, I had widened both jaws in the molar and bicuspid regions to make room for the necessary rotation in the anterior region, with the result that I had less overbite in the anterior region when I finished than I had at the outset; as a matter of fact, scarcely any. It is my present belief that the arch form into which I placed these teeth was by no means the arch form which they should have occupied. The eruption of the third molars played havoc.

And still another writer, who doubts the wisdom of such a discussion as I will bring forth on this subject, in referring to my attitude toward early treatment, says:

So much of your treatment is delayed until nine or ten years of age, or later, and in cases of this type, so far as my own experience goes, the percentage of failures or partial failures is very much higher than it is where the occlusion is successfully corrected at a very much earlier age. This thought, of course, leads naturally to the conclusion that you will paint a picture much more pessimistic than I believe the conditions justify.

He says further,

I have not kept definite, tabulated records on what has happened to cases several years after all retention has been removed. Many of these cases have never come back for observation, but the percentage of satisfactory results, where I have been able to keep track of them for a long time after removing the retention, has really been very gratifying.

I can say, however, with equal frankness that I have had two cases which went under treatment at five years of age, where every incoming tooth was guided into correct occlusion as it erupted and, yet, where utter collapse followed almost immediately after the removal of the retention. These cases both possess unusual muscular development in the lips and cheeks and are both complicated with nasal occlusion which has never been corrected, notwithstanding several efforts to do so. The interesting thing in connection with these cases has been that as the arches collapsed the teeth, of course, became crowded and rotated, but did not assume the original malpositions which were in evidence when the teeth first emerged from the gum and which were represented in my original models by penciling in the positions. It has been my experience repeatedly, where collapse has taken place in cases that were treated

early, that the final malocclusion was of quite a different character from that originally encountered.

My success in treating Class II, Division 1, cases, where there has been a deep overbite, and even in Class I cases, where a deep overbite has resulted from the premature loss of some deciduous lower teeth, has really been very gratifying. On the other hand, my success in treating open bite cases has been extremely unsatisfactory.

These reports come from men who have had from fifteen to twenty years' experience in the practice of orthodontia; they are men possessed of unusual technical ability; they have been earnest students of the problems that have confronted them in practice; they have held to the highest ideals in their work, and yet their reports indicate that they have no assurance of ideal results from their treatment. They have had satisfactory results in large measure, yes. In many cases their results have been most gratifying. But the *ideal* they have worked toward has been attained so seldom as to be almost negligible.

If I interpret their letters correctly their experiences have been not unlike my own. I could recite many cases in which I could not secure an ideal overbite; and many others in which I could not establish an ideal mesio-distal interdigitation of the molars and bicuspids *on both sides of the mouth*—in these cases one side would appear ideal and the other side be "off center." I could add to these, others in which I could not produce a *permanent* alignment of the upper and lower incisors and cuspids, but contrary to the conclusion of one of my correspondents last quoted, my failure to obtain satisfactory results has been as frequent in those cases that were begun at the early age of five or six years as in those that were started at the age of nine or ten.

And yet with this great variety of imperfectnesses as the final result of our labor, the work of the orthodontist has been eminently successful. The so-called imperfect results referred to in this paper are, to a large degree, natural imperfectnesses, or normal individual

anatomical variations. Such variations are found in every other part of the human anatomy, and are particularly apparent in cranial anatomy. They are imperfectnesses only because we have been measuring them by an artificial and false standard. In my opinion, they cannot with any degree of reason be classed as orthodontic failures, but, on the contrary, I believe they represent only natural orthodontic limitations.

In all anatomy, including that of the entire animal and vegetable kingdoms, the *normal* embraces a wide range of variation, and the human mouth is no exception to this general rule.

It is just as absurd to expect to make every malformed human mouth conform to a fixed standard as it would be to attempt to make every Greek boot-black into an Apollo, or every Italian fruit vender into a Roman Adonis.

To show how rare this generally accepted ideal type of occlusion really is, Dr. Ottolengui, several years ago, called attention to the fact that all the pictures used by all orthodontists all over the country to illustrate *normal occlusion* were made from the same two or three skulls, and one of these was only half a skull, and one a negro.

In presenting this paper to you I have had no desire whatever to be iconoclastic or reactionary, but I do believe it is time to discuss our limitations. If the experiences and conclusions recited here by my correspondents and myself indicate that we have been unable to produce results that are 100 per cent. perfect when measured by an artificial standard, it is nothing to the discredit of orthodontia. If there are some cases of malocclusion in which it is impossible to establish a condition that we might even be pleased to call an "individual normal," it does not mean that there is

not much good work, much excellent work being done in this specialty. There are splendid results being accomplished every day. But for this Society to permit the younger men in practice and the inexperienced students of orthodontia to continue to believe that the so-called "ideal occlusion" is probable, or even possible, of attainment in many of the more severe forms of malocclusion is to be guilty of what Mark Twain very appropriately calls the "lie of silent assertion"—a lie that "can be told without saying a word." And this to a considerable degree is just what we have been doing.

A while ago I was reading one of those delightful little essays by Samuel McCord Crothers and was struck with this observation:

Try as we may for perfection the net results of our labor is an amazing variety of imperfectnesses. We are surprised at our versatility in being able to fail in so many different ways.

Crothers was not an orthodontist. He perhaps had never heard of orthodontia. He applied this observation to all vocations in life as he had known them.

Certainly, "the net results of our labor (as orthodontists) is an amazing variety of imperfectnesses." Unimportant imperfectnesses, but imperfectnesses nevertheless when measured by our conception of ideal occlusion. And with such a prognosis for the average case of malocclusion, it seems most ill-advised, to say the least, for the orthodontist to attempt the correction of every slight malocclusion that is presented in practice. In many of these cases it is dangerous not to "let well enough alone."

576 FIFTH AVE.

[See also *Discussion*, as reported under "Proceedings of Societies," this issue.]



## Present-Day Practices in Dentistry.

By THOMAS P. HINMAN, D.D.S., Atlanta, Ga.

(Lecture given before the Maryland State Dental Association, Baltimore, Md., June 15, 16, 1920.)

I AM going to indulge in a little chat with you this afternoon on our present-day practices in dentistry. My reason for this presentation is that we have advanced so rapidly in our work and technique, in our methods, that the minds of some of the younger and later men are somewhat confused as to just where we stand in relation to present-day practices and methods in dentistry. We are becoming a highly specialized profession, apparently. I remarked recently on the increasing number of oral surgeons in New York; at least they call themselves that. I do not know whether they are all surgeons or not. I find that same thing true in a great many other cities. Besides that, it seems to me a certain number of men who have specialized in certain kinds of dentistry believe if you do not do the work the way they indicate it shall be done you are damned. It is, therefore, I think, high time that we make a sane, reasonable and sound analysis of present-day practices. Let us locate ourselves.

It so happens that I have been a teacher of dentistry for nearly thirty years. I have seen the rapid growth of our profession, and the revolutionary changes which have taken place in our teaching methods. I have had many inquiries of late coming to me from men whom I have taught in the past and also recent graduates as to what are the best accepted methods of practice. All these things have made me think, and I shall endeavor this afternoon to give you my point of view of our present methods of practice.

### DIAGNOSIS.

Let us begin with the most important of all phases of practice—diagnosis; the phase of practice in which I am very much ashamed to say we are more deficient than in any other branch of our profession. We are not diagnosticians. What is the first thing to be looked for when we examine the mouth? Cavities first, followed by observation of bridges and crowns. We lose sight of one great thing that is essential to success in the practice of dentistry and that is complete diagnosis. We do not first examine the soft structures, which are the foundation of the whole denture; but we endeavor apparently to examine the mouth with the idea of making fillings and restorations and not with the idea of looking for diseased tissues, and at times we forget that unless the foundation of this building is secure the structure that is placed upon it will only be of a temporary nature. Therefore, we are not in the strictest sense dental diagnosticians. "Ah," you say, "we have the X-ray." True, but try to keep one fact clearly in mind, that an X-ray picture is only one of the factors in diagnosis. How many times have you taken a picture and examined it and have said, "Oh, yes; do this or do that." It is absolutely absurd for any man to take a picture and decide what to do with the teeth without knowing the general conditions of that mouth and of that patient.

Experience has taught me not to depend solely on the X-ray picture as a means of diagnosis. It is the biggest



liar in the world. Baron Munchausen was a pigmy compared with the X-ray. "How do you know?" you ask me. Why, it happens that I have been doing X-ray work for twenty-three years, and I believe that is a reasonable length of time in which to form an opinion, and I have come to the conclusion that of all things we have in our practice the X-ray picture is the most deceptive. It gives an idea, it is true; but are we sufficiently versed in the anatomy, histology or histopathology of the parts to properly use the X-ray in making our diagnoses? It is a part of the diagnosis, yet we take X-ray pictures and say, upon examination of them, "This should be done or that should be done," never taking the other factors into consideration. There is no question but that this is the foundation of a great many of our failures.

If we would only use the God-given faculties of sensation in the ends of our fingers and be guided by the appearances of the gums and the supporting structures that we can see, we would be better diagnosticians. It is absolutely astonishing what we can learn if we will palpate the gum margins with our fingers, what a large percentage of cases will show the existence of a diseased gingiva, which is the primary infection in pyorrhea, a streptococcal invasion, with an exudation; much is apparent, but it is not considered. If we would use our fingers to examine every portion of the mouth to see if there is any exudation, we would learn much that is necessary, and I think that is one of the greatest errors into which we have fallen.

I wish to refer to the dangers from food wedges. I believe I can say truly that out of this audience before me from eighty to ninety per cent. have food wedges. It is rather an exception to find mouths without food wedges. How often do we look at the mouth with a view of finding them? And yet it is one of the most destructive of all the troubles we have that undermine the supporting structures of the teeth. Food wedges are so frequently found in between the upper second and third molars, always where the lower first molar has been extracted,

on account of the malocclusion. I want to assure you that food wedges are just as easy to find as other defects. If you will palpate with the index finger of the right hand on the finger of the left hand between the second and third molars, they are easily discovered, as there is always a lingual depression at the point where the food wedge occurs. It is an occlusion proposition—the distal cusp of the lower third molar comes in between the distal and the mesial cusps of the upper second and third molars, respectively, driving the teeth apart and allowing food to wedge between them. If you will examine the mouth carefully, you will discover that, and by correcting the condition you will render a service to your patient which is far more important than bridge work.

What I want to particularly impress upon you is the necessity of cultivating the sense of touch in the examination of the mouth with the fingers. I can say truthfully that from ninety to ninety-five per cent. of all granulomata can be found without the aid of the X-ray. You can discover those conditions by palpation. The only benefit from the X-ray is that it gives you the character of the destruction and the approximate amount of the area destroyed, but by simple palpation you can discover a granuloma just as easily as with the X-ray.

#### PYORRHEA.

Let us take up next the question of pyorrhea. I have said previously that pyorrhea in its early stages can be demonstrated by palpation. It is perfectly astonishing if you will examine the gingival margins of your cases what a large percentage will show an exudation before it goes into the pus stage, and when it goes into the pus stage it is very destructive of the supporting structures; but before the secondary stage takes place it is not difficult to eradicate. Pyorrhea is manifested early by a slight exudation and at this stage is just as curable as any other minor trouble that manifests itself in the mouth. The point I am trying to get into your minds is that

if we make an early diagnosis of pyorrhea, it is easily curable and it is perfectly astonishing the immense number of jaws that show this slight exudation. I have seen pyorrhea in children beginning at fourteen years of age. I have seen it in all kinds and characters of mouths. Every case is examined with the idea in view of discovering pyorrhea. It is easily curable if we get it in its early stage—in its primary form.

Another point that is important: In the secondary stage of pyorrhea, when it has gone into the pus stage, no case of pyorrhea can be properly diagnosed without the aid of the X-ray. How many cases have specialists in pyorrhea seen where there was an enormous destruction of bone and little external manifestation of the disease? There are two distinct types of bone destruction in pyorrhea as shown by the X-ray. One, the condensed form where the bone is condensed in the attempt to resist the invasion of bacteria. The other where the infiltration will go deeply into the bone. In the case of the condensed type, where the tissues are not too far gone, success may be obtained, but wherever there is sway—according to the formula as worked out by Dr. Coriell—equal to two-thirds the width of the tooth bucco-lingually, the case is then beyond repair.

No case of pyorrhea is curable where we have as much as four per cent. sugar in the urine—diabetes. Frequently we have no idea of the physical condition of the patient. We do not make a proper diagnosis of the case, but start in treating it without knowing the cause of the trouble. There is no use treating pyorrhea when there is diabetes present; it will not get well where there is as much as four per cent. sugar in the urine.

#### PROPHYLAXIS.

Now, as to the question of prophylaxis in children. If proper prophylaxis is given in the mouths of children and the children are properly taught to handle the toothbrush and take care of the teeth, pyorrhea will not develop. Therefore, I am thoroughly in sympathy with any

movement for the checking of the pyorrhea menace which gives children real prophylaxis.

With this comes the question as to what we are to do for the children. I believe the best material with which to make healthy men and healthy women is healthy children. We cannot produce strong men and women unless the child receives proper attention. We cannot develop the child into a healthy man or a healthy woman unless we train it accordingly. I believe there has been instituted in one of the dental teaching institutions a chair of pediatrics, and I believe we will have that carried out more fully some day.

Then comes the question of orthodontia, which is a highly specialized branch of our profession. If the child has proper care and we are able, by a knowledge of mouth conditions, to understand those conditions, eighty to ninety per cent. of all irregularities can be prevented. Are we able, I ask you, to know the oncoming of these irregularities? A large percentage of irregularities are due entirely to habits. How frequently has a child come into the office of the dentist to have the mouth examined where he can readily see the beginning of irregularities, and how frequently those who practice orthodontia have been told by the parents that their former dentist had told them to wait until the child was ten or twelve years old before doing anything with those irregularities? That is too late. Ten or twelve years is too late. When we pay proper attention to the child and examine the child's mouth with the idea of preventing irregularities, then we have performed the greatest possible service to the child and to our profession.

#### PROSTHESIS.

Now we come to the question of prosthesis. There is nothing that has really been more revolutionized in the practice of dentistry than prosthesis. There have been a number of men all over the country who have specialized in this work, but the younger men coming on do not



know just what to do in reference to the practice of prosthesis. First, if we take up the question of impressions and casts, I am thoroughly convinced after many years' experience that the average man will get better results with the combination of modeling compound and plaster than with either one used separately. In relation to artificial dentures, there is no reason today why the average practitioner cannot make as good an artificial denture as anyone else if he will give the time to it. How does he go about the work? He takes an impression and sends it to the laboratory and the plate comes back and does not fit. If you are going to do it, do it right. If you cannot, send it out to somebody that does it right; but this idea of trying to make a patient's mouth fit a denture is wrong. If you will take time you can make a denture, but do it yourself or leave it alone. The same thing applies to the partial denture. You cannot take a working model and send it out and have the work done for a proper artificial replacement.

#### CROWNS.

Now comes the question of crowns. How well I remember the advent of the gold crown. I would, however, change its name; I would call it the "great American crime" instead of the gold crown. It is the great American dental crime, and has done more damage in all probability than any other method that has been originated in dentistry. Did you ever take off a gold crown that was not foul smelling? I never did. Of all the filthy things put into the mouth, the average gold crown is the worst. Why? Because I never saw one that would fit. I never saw one that did not irritate the gum. Many are made in such manner as to really look like an old-fashioned band box. Have you ever seen any attempt made to reproduce nature? Have you ever seen any anatomical occlusion in such crowns? We have many other better methods of tooth restoration, still we persist in cutting down teeth and putting crowns on them when we know they will never fit? Why not make the

shoulder crown, if we have to use a crown? The shoulder crown is just as easily made if we take time to make it properly. Did you ever notice that a few months after the average crown is put on the gum recedes buccally and sometimes lingually? Why? Simply because the buccal contour was flat, and as the food came down it tore the gum away. Did you ever notice that in the average anterior crown the gum recedes, and do you know why? Because it was not a proper anatomical restoration. As the food was bitten off it sheared away the gum, tore it away; yet we wonder why the gums receded! The wonder is that such a crown ever stayed in the mouth. If a crown is made it is just as important that it have a lingual surface, that it is correct anatomically, as it is that it is correct in cosmetic appearance. If we are going to make crowns, let us do it anatomically.

As to the pin crown. I remember once in Birmingham when Dr. G. V. Black happened to be there, someone asked him, "Why does the alloy pin turn the teeth green?" His answer was, "Why do you want to put in alloy pins?" That is what I want to talk on. Why put them in? There is no place for them in the practice of dentistry. You will observe in the use of pin crowns—and that is the reason why I speak of that—a large percentage of them split, and the split always comes from one reason, and that is malocclusion, an incorrect anatomical lingual form. Therefore, we find if we are to successfully crown teeth, we must imitate Nature; if not, our work is a failure.

#### BRIDGE WORK.

We come now to the discussion of the question of bridge work. Oh, Bridge Work! How many crimes are committed in thy name, real crimes? We have two factions in bridge work. One man says, "If you put in a fixed bridge, you are damned." The other man says, "If you put in a removable bridge you are damned." Let us consider for a moment the comparative merits of fixed bridge work and removable bridge work. I have



seen a great many partial dentures called removable bridge work. I find men do it because they get bigger fees for removable bridge work, and sometimes I think that is the only reason. Now then, let us look facts in the face. In a large percentage of cases we will find that partial dentures are very much better than the so-called removable bridges. The average removable bridge as I have seen it, and I have done some of it, is no cleaner than the fixed bridge. Did you ever remove a bridge for a patient who removed it and cleaned it three times a day? Most patients remove them once a month. Is not that true? Yet think of that stuff in the mouth, and they call them removable bridges. I make some of that stuff, too—so-called removable bridge work. Let us place it where it belongs, but let us look at it straight in the face.

Certain cases present themselves to you where a well-made fixed bridge is by far preferable to anything in the shape of a removable bridge. I remember once in Los Angeles I went to see a young man who was a great removable bridge worker. He had bridged over the space of a first upper bicuspid. He had a great big inlay in the second bicuspid and one in the cuspid that would kill the pulps in both teeth. He put in a bridge and could not remove it after he got it in. How much better it would have been to have made a simple, properly shaped fixed bridge and have that bridge with the occlusion right. If your occlusion is correct and your piers are correct and your clasps are correctly made, these bridges will stay in position, and can be kept clean, and the patient is very much more apt to keep a well-made fixed bridge clean than a removable bridge. I want to ask you, who do both lines of work, if this is not true?

#### PIERS FOR BRIDGE WORK.

Now we come to the important question of piers. I do believe in vital piers, as much as possible, and I certainly think that under our present methods we can do practically all bridge work on vital piers. If we cannot do otherwise, put

in a little denture, but let the pulp live. Well-made partial dentures are far better than poor bridge work.

First, we have hoods for the anterior teeth. Of all the hoods that have been made, the hood made by Charles Alexander, who was the pioneer in hood technique, is the most excellent and was the one that first came out. We hear much about various new hoods, but he originated the hood before some of these writers were born. In that connection I am reminded of an incident that occurred in Atlanta two or three months ago, when we had our meeting which was attended and addressed by our friends, Drs. Grieves, Frank Roach from Chicago, Theo. Maves from Minneapolis, and George Winter of St. Louis, who talked on these subjects. At that meeting Frank Roach told us about his wonderful clasp. I remembered reading something on this subject by Fox and Harris and I said to some of our friends, "Let us see what Fox and Harris say about the clasp." So we took the book published by Fox and Harris in 1846, and there we found almost word for word what Frank Roach had said that morning about clasps. So we have nothing so awfully new after all in clasps. Coming back to the hood, I believe Charles Alexander is the man who really originated this method, and if we are careful in our technique, as he is, and he does wonderful work, we will get good results, and if they are properly constructed and properly adapted we can maintain the vitality of the piers.

You cannot construct a bridge by being more or less careless in the technique. I do not think there is anything dangerous in the so-called movable pier. They all have a certain amount of motion, and if the occlusion is correct, and there is not too much strain on any one individual tooth, it will not develop, as a rule, any great damage to the piers. It is a question more of occlusion. We have had different types of removable bridge work, and lately we have heard much of the clasp type. To my mind, the clasp bridge particularly as developed by our friend Nesbitt of Boston is noth-

ing more than a simple partial denture. You may call it a removable bridge if you wish, but have it clasp the teeth properly, have it properly adjusted, and it is a most excellent means of restoration.

We now come to the telescope crown. I do not believe anyone can obtain a proper fit with the telescope crown. We have also the slot type of attachment, and with that we reach the end of our journey. With the slot attachment there has not one been created that does not break. The patient is coming in all the time with the attachment broken at the neck, and I do not know anything that causes one as much embarrassment as that. I do not believe from my observation and experience there has yet been a form of slot attachment created that is satisfactory. And again, sometimes you get them on and cannot get them off. The great difficulty in this type of attachment is that they break at the neck, and you have to come back to the old split pin type. How many of these have you made where the pin broke? They break off where they are soldered in the crown, and that is another embarrassing situation. You will say, "Incorrect construction." All right, let us make the construction correct and they break just the same. The old split pin—and they all stand for dirt—is the dirtiest one of the lot.

#### ROOT-CANAL WORK.

Now we come to the question of root-canal work. Every one of us has his own ideas about root-canal work and will fight for them. Root-canal work is the real nemesis of the dental practitioner. In the old method of root-canal treatment we have put in a little of this and a little of that drug today—four or five different things—and a little more tomorrow, and still a little more the next day, and we do not get anywhere at all. Let us have a definite technique; something definite that we can do with every case, not by using a little of this and a little of that and forcing bacteria down the canal. You cannot secure success that way.

I wonder if we ever consider to what our successes are due? Has our training been in the aseptic line? Have we not been trying to do antiseptic dentistry rather than aseptic dentistry? All the medicines you can get into the root canal will not sterilize it. Take the work of Pond; he found that iodine was the only one with which he could do very much, and yet we force into the root canal nostrums of all sorts containing many ingredients with the idea of securing sterilization. If we want to prevent infected canals, we should use some definite technique for sterilization, and keep practicing that one technique for years and we may get somewhere, but if we are changing from day to day, how can we expect to get results? Do you think a surgeon would cut into an infected bone one day and treat it one way, and then the next day have the patient come back, take out that dressing and treat the infection with oil of cloves, formaldehyd, iodine, etc.? Such a man would be run out of the country. Have we not done the like in a tooth? Let us follow something definite. What we have been trying to do is antiseptic dentistry, and we are missing the mark.

One of the greatest factors in the formation of granulomatous areas is the lowering of the vitality at the cemental apex by over-medication. If we continue to use powerful antiseptics and force them into the root canal trying to sterilize the apical areas, we will fail. It seems to me it would be well to think how this infection got there. Through the blood stream? Possibly, but more probably as shown by Noyes in his work on histology, the infection got there through the gingival fossæ. All you have to do is to lower the vitality of the apex and you can get infection. Do not think for one minute that all granulomatous areas originate through acute abscesses. Ninety per cent. of the original conditions were produced by the lowering of the cemental vitality. There must be recognition of original conditions. Let us be rational about this thing.

Another point to which I wish to call your attention: In the average dental



magazines, and I am not speaking of any particular dental magazine, you will find many advertisements of nostrums to cure dental diseases; nostrums for the filling of the root canals, etc. Nearly all magazines are carrying advertisements of this kind to catch the man who reads these advertisements, but when he puts these nostrums into the root canal of the patient, that patient walks off and never comes back. Later on, however, if he radiographs that root he will find there a beautiful granuloma due to the fact that over-medication has destroyed apical vitality—the vitality of the tissues at the apex, and yet many continue using those nostrums. Let us adopt something definite; that is, a definite method that you know can be used for opening up the root canal, using some formula of the highest type for filling, like that of the Callahan method. I want to say, incidentally, in my office five or six years ago we adopted an absolutely definite technique in root-canal work and we never vary from it. Some day we will publish the results.

#### GOLD INLAYS.

Now, let us come to the question of gold inlay, a method that has been a godsend in the practice of dentistry. How many of us make gold inlays? Occasionally I see a case that looks as if the dentist who made the gold inlay picked up a piece of putty, the color of gold, and daubed it in the cavity. I have seen cases of irregularity develop due entirely to bad occlusal inlays, and I am sure the orthodontists present will verify this statement. If we are going to put in gold inlays, why not carve the occlusal planes properly? If properly carved then we can expect restorations that will not cause any irregularity, and will not reduce the normal efficiency of the mouth. I have seen a number of instances where the ability of the patient to masticate food was decreased forty to fifty per cent., due to the fact that the occlusal planes could not come in contact and could not naturally grind the food substances. It is just as easy

to carve those planes in putting in the inlays, in making restoration of the part of the tooth that has been lost, and bringing it back to the natural condition, as it is to put in an artificial plate with the proper occlusal planes.

The question comes up, what method shall we adopt—the direct or the indirect method? That is a question which every man must decide for himself. We adopted years ago the indirect method, and are still using it. If you ever want to investigate the indirect method of making inlays, my advice is to begin soon. I presented this method before this society in 1912 here in Baltimore, and I have not varied since in the making of inlays by the indirect method. We think we get better results. In the old days, in 1906 and 1907, the direct methods were the methods developed at that time, but I believe we are able by the indirect method to secure better occlusal planes. You can get a fit by your direct method. That is, of course, what we want, but if you want to get correct occlusal planes properly carved, my advice is to use the indirect method.

#### PORCELAIN.

As to fillings; if you want to get a filling for the gingival surface, there is only one material that is the material *par excellence*, and that is porcelain. By the indirect method it is just as easy to make a filling of porcelain as it is of any other type of filling material. Porcelain is coming back. The porcelain furnaces are being resurrected. Porcelain is the material we all have to use if we wish to get results at the gingival surfaces. The old cases where porcelain restorations have been in for twenty-five years are coming back now. I see them right along and they are still in a healthy condition. It is time for us to get out our porcelain furnaces and begin to do porcelain inlay work. It is the only filling from which the gum does not recede.

There is one point I overlooked when I referred to crowns; that is, the day is coming when we will have to do porcelain jacket-crown work. There is noth-



ing that makes a restoration equal to a porcelain jacket crown. If porcelain jacket crowns are correctly made, and the occlusal surface is correctly carved, a porcelain jacket crown will last as long as any other crown in the mouth. The time is coming when the porcelain filling is coming into its own, and it behooves every one of us to use porcelain.

#### AMALGAM.

We now come to the question of amalgam fillings. How many mouths have I seen in which there are amalgam fillings with the dentist's trade-mark on them—finger prints. Amalgam, of all materials, is the most difficult to manipulate. I do not believe there is any other material that is so difficult as amalgam if you handle it properly. Amalgam has only a small place in my practice; it is not used for any approximal surface. For an approximal surface the amalgam filling is a failure. You put in what you say are beautiful fillings, and expect them to stay there, but if you will examine them a few years later, you will find the amalgam chipped off; and in the course of two or three years the material will be bulging over at the gingival border. If I ever did any amalgam work it would be the most expensive work that I would do. We have to charge more than for gold, to do it right, but I believe that amalgam is not the material to be used for approximal fillings. I realize that some men do beautiful amalgam work. We have all tried it, but amalgam is not stable. We may some day get a stable material, but I question it as a general proposition, because I thoroughly believe that amalgam is a failure as a filling material.

The dental profession is like any other profession, inclined to lean toward the easiest method. When synthetic porcelain first came out it was plastered all over the mouth. It is easy to use and because it is and because our patients demanded it, we all used it, and many made the mistake of putting it in the anterior teeth. Let us look at the matter squarely. Examine the fillings and see

if they are not rough after six months\* or a year's time, and also see if in cervical cavities the gum has not receded. Is there any place for it at all? Yes, there is in certain cavities. In the small approximal cavities of the six anterior teeth, if it is properly put in and properly adapted, it makes a very satisfactory filling, but if you want permanency and want to avoid recession of the gum, you had better not try the synthetic filling. On the incisal margins, if you expect to build up a good contour, use porcelain; synthetic will not stay—it rounds off and breaks.

#### INDISCRIMINATE TOOTH EXTRACTION.

We now come to a live question and that is the question of extraction. We have a group of practitioners in this country who call themselves the "one hundred percenters," who extract every tooth in the mouth where the pulp is not vital, whether there is any destruction of the tissues going on around the apex or not. Have you read the work of Collins of the Research Institute? Do you realize that in fifty per cent. of the teeth affected with pyorrhea or with any disease at all the pulps are infected? If you are going to extract every tooth that you think is infected, where are you going to draw the line? We want to begin to think logically; we want to begin to think of many things and to consider carefully this matter of extraction. This fad of extracting every tooth because we think it is infected is absurd.

I have been watching for years these fads that have come over the profession. Take for instance crown work. We have been crowning everything; we have been wild on the subject.

There are one or two things, however, which I wish to review and dwell on particularly. I want you to think about this: If you do your X-ray work properly, if you examine the teeth, and after having proper radiographs of the teeth, if you think a tooth must be extracted, think of several things. Of course, first is the question of the patient's health. Think of the effect of the loss of that

tooth and what it means to the patient, and then think if there is not some method that can be used for the preservation of that tooth. No tooth suspected of being infected, in my opinion, should be extracted unless there have been three distinct views of it taken with the X-ray—taken from three different angles. Keep in mind, too, that one of the worst forms of infection we have around the apex is the rarefying form. If we have a condensed area, the chances for retention are very much greater than in the cases where we have an extensive rarefied area. Finally, keep your balance; keep

your mind level; do not run after untried things. The profession has chased a great many butterflies in the last thirty years; some men sacrifice their lives running after butterflies. Let us be a thinking profession; a rational profession; let us be a profession that will be an ornament to this country. Let us do things in a rational way. Let us reason together and when we have reached a conclusion, let us have a firm and solid foundation so that we may have a reason for everything we do.

FOURTH NATIONAL BANK BLDG.

## Industrial Dentistry.

By C. A. BOGART, D.D.S.

DENTIST TO THE ABERFOYLE MFG. CO., CHESTER, PA.

IN the brief consideration of my subject which I shall make this afternoon, it will be advisable to deal with it under the following headings:

1. What place does a dental clinic play in the economy of an industrial establishment?

2. How should it be directed in order to obtain the best results?

3. The nature of the dental work to be done.

Before considering the topic, I wish to lay emphasis on certain facts which are essential to the subject. Unless, for instance, there is a clear understanding on the part of a corporation regarding the nature of the expense and work entailed by establishing a dental clinic for its factory or shop, the dentist's position will be a very difficult one at times and the work will very often be seriously hampered.

Let me, therefore, deal with my first point, namely, the place the dental clinic would have in the economy of an indus-

trial establishment. This question is a difficult one to answer fully, for the reason that we are not yet sufficiently acquainted with the industrial conditions which have to be faced and solved. But from my experience I have come to view the matter in the following light:

The dental clinic being one of the departments devoted to the welfare of the employees, is naturally a part of the service department. It has grown out of various and complex causes of our present economic and social conditions, just as factory rest rooms, restaurants, gymnasiums and medical dispensaries have. It seems to me that none of these departments were instituted from entirely altruistic motives and, therefore, in approaching our question we shall reach more practical decisions by at once discussing this aspect of the matter. A manufacturing concern would, therefore, view a dental clinic from the standpoint that such a department must, if carried out properly, result in the greater efficiency of its workers. It may be argued



by some that those more acute dental conditions which do interfere with the work of an employee could be rectified by the medical dispensary, but this view is a very limited one and one likely to defeat the main object of such a clinic, for the reason that the average medical practitioner is unacquainted with that branch of dentistry known as conservative dentistry. A case in point would be that of a patient visiting the medical dispensary with an acute alveolar abscess for which the treatment would, in all probability, be extraction. If, however, such a patient presents himself to the dental clinic he would be assured of every opportunity of having the condition in question alleviated and cured. Many other instances of similar character will suggest themselves to you. Then, of course, we have numerous incipient conditions which only a dentist would be qualified to recognize and institute the necessary precautionary treatment.

It seems to me that the companies that have established dental clinics have recognized, first, that an employee whose oral cavity is in an unhygienic condition (and I use this term in its broadest sense) is not only below par in health but is under a severe handicap, in that he is predisposed to the numerous ills attendant on such a mouth; and, secondly, that the only satisfactory method of coping with this problem is to establish a dental clinic independent of the medical.

From personal observation in my work at the Aberfoyle Manufacturing Company, I find that conditions of malnutrition, anemia and general systemic disturbances are manifested in the supporting structures of the dental organs long before they are observed elsewhere, and when note is made of such conditions and recommendations made with the advice of the medical department, the susceptibility to other infections may be avoided by building up such a person's resistance. Of course, this prevention cannot be estimated at the present time, but I would venture to say that the correction of these conditions with also the

correction of the dental conditions will as time goes on add years to a person's usefulness in his particular line of endeavor.

Another point; persons who have had the "flu" and have recovered invariably have some marked dental trouble which if taken in time may be corrected before the loss of the dental organs takes place.

In certain factories where conditions are definitely predisposing to dental diseases, such as chemical works, glass factories, candy factories, shops where many lathing and grinding machines are operated, the companies' responsibility (if it can be argued that any responsibility does exist) of rendering dental service to their employees is, of course, more direct.

Having discussed our first point and having come to the conclusion that a dental clinic is established in a factory, shop, etc., to the end of obtaining better results from the worker and that in the light of modern medical science specialized treatment, which can only be given by the dentist, is the undisputed method of reaching this object, let us now proceed to our second point and briefly discuss how to direct the dental clinic to obtain the best results. Our problem here is one which depends on a number of factors. In the first place, while the company concerned may have arrived at similar conclusions to ours, it is oft-times very difficult to impress upon them the extent of work necessary to deal with certain septic conditions in the mouth. Therefore we too often find one dentist trying vainly to handle work which would keep two or three men employed. Therefore there should be some relationship established between the dentist and the amount and nature of the work he is expected to do.

As an example let us take a factory of 3000 workers. If the object of the dental clinic is, first, to examine each mouth; secondly, to remove general septic conditions when necessary and, thirdly, to give conservative treatment, such as fillings, root-canal work, etc., one dentist would be unable to deal with these conditions. Therefore, as I have said, some



proper relationship should be established in these matters and if, in the conditions above mentioned four dentists are found necessary, it should be recognized that any number short of this will proportionally reduce the advantages which were intended by the installation of such a clinic.

My own opinion on the matter is that a dental clinic should not only deal with acute dental trouble, nor should it stop with conservative treatment, but that it should be compulsory in some degree for the examination of each employee as a precautionary measure.

It is my experience that when the attendance on the dental clinic is optional with the employee, by far the greater percentage of cases which present themselves for treatment are suffering from some acute condition, and that the percentage of those attending for an examination of their mouths is equivalent to the amount of alcohol in the beer sold today, one-half of 1 per cent.; and this percentage usually is represented by young girls with unsightly cavities in their anterior teeth.

As has been stated the percentage of those who desire conservative dentistry practiced, where dental attention is not compulsory, is small. Therefore some plan either of education or moral pressure should be formulated whereby such persons would receive dental care periodically, in order to prevent these acute conditions. We at the Aberfoyle company are now endeavoring to formulate a plan whereby moral pressure will be brought to bear on the employees to attend the clinic, although the dental clinic is now very well attended. If you can bring home to these people the reasons why they suffer from malnutrition, anemia, indigestion, etc., by little examples of how our government spends so many millions of dollars to see that our water supply and foods are pure, and then they contaminate them by placing them in filthy mouths, very often they will see your point and you will receive their coöperation. This work then goes farther, they look to the mouths of their children and this is the place where all

conservative dentistry should start. This point I cannot emphasize too strongly, as very often the presence of diseased tonsils and adenoids in children affects the teeth and then eruption, thereby causing malocclusion, cavities, etc.

Now, having recognized the benefits which result when the worker is in a state of comparative health and having established a dental clinic to secure this condition, it seems only good policy to have the most thorough dental work done and to overcome either the ignorance of the worker or his fear of the dental chair by some method of compulsory attendance.

Each concern would, of course, have some way of apportioning the expenses which such a clinic would involve. In one case the cost of the treatments including the material used is entirely borne by the company, while in other cases the material used is paid for by the patient; this latter course seems to me to be the more desirable, as people value things more if a price is put upon them, even though the cost is small. The dentist of course should be paid a fixed salary.

And finally (it cannot be too strongly emphasized) the dentist should have full control of his patients; he should not be under the control of the medical dispensary in any form whatsoever, but this does not mean that these two departments should not coöperate.

I now come to my third point; namely, the nature of the dental work done. In this connection I have already stated that the scope of the work should start with an examination of each employee to discover what dental work needs to be done. I would again suggest in this connection that the examination be made periodically.

Upon my third point, it may be of interest if I briefly report on my work at the Dental Dispensary of the Aberfoyle Manufacturing Company, Chester, Penna. This dispensary was organized in July 1919 and opened on the 4th of August of that year. The attendance of the employees in that dispensary is in no way compulsory. The patient in each

case pays only for the cost of material actually used upon him. The maximum duration of each visit is limited to one-half hour per day. The number of patients attending from the 4th of August until the 31st of December was 272. Of these 227 have been discharged as completed or they have stopped attending, having secured sufficient relief to satisfy them. There are at present 64 patients on the active list, and over 500 patients have attended. Up to December 31, 1919, the following is a list of the operations performed:

Amalgam fillings .....	361
Prophylaxis of oral cavity .....	173
Extraction (including extraction under nitrous oxid and novocain) .....	138
Cement fillings .....	66
Silicate fillings .....	71
Various treatments for and including acute and chronic abscesses, gingivitis, pyorrhea, devitaliza-	

tions, pulpitis, pulp capping, removal of gum around erupting third molars, treatment of sockets after extractions, filling root canals, etc. .... 262

No figures for examinations or consultations have been kept. This will give you some idea of the scope and nature of the work which is done at the Aberfoyle Mill.

I am aware that the nature of my paper would be more complete were I able to secure some data from older established industrial dental clinics, but as it is difficult to get this information I have endeavored to place my subject before you in the light of my experience.

In closing I may say that the interest I have always taken in this subject has been very much stimulated by the variety of problems which are constantly coming up in this field.

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## Language Building.

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By J. LE GRAND, D.D.S., Chicago, Ill.

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PERHAPS no task is more disheartening than attempting to keep the language of the common people pure. But when all is said, why should we worry much about it? Enough men will argue that the function of language is to convey ideas and if the ideas are expressed well, why grieve? Similarly do others think of spelling. Is not English spelling a task for scholars and a pastime for pedants anyway? An ordinary man could never be held for a misspelled word. So why fuss! Is not the context to aid interpretation when words sounding alike are spelled differently? To add to the difficulty, also, most of us enjoy an occasional descent to the Avernus of local speech and mannerisms, just to be folks for a while. Few of

us care to keep ourselves on the chilly heights where altitudinous English is perennially spoken. There is a decided pleasure for most of us in taking off the social or linguistic uniform and "putting on something loose." The result is that the purist in language has had to see, begrudge it as he will, the intrusion of apt and homely forms, and for the classic a simplified or phonetic spelling.

When we consider the terminology of dentistry we often make wry faces or turn from the linguistic neoplasms that obtrude themselves upon our ears. In some respects we differ from our foster parent—and I ask notice of the relation mentioned. We are not a natural child of medicine, but are headed toward adoption. We do not have the heritage and



tradition of that great department of human endeavor, and as legacies of our humble origin many words as common as a street greeting have journeyed with us through the years. Some of them measured very well with the understanding of the time that produced them, but to-day they are sadly insufficient. Again, terms have been taken out of the soil to which they were indigenous and transplanted where they were incompatible, where welcome could scarcely be intelligently offered, but strangely enough, they are in common parlance today and strike the ear without offense—without *much* offense.

Two illustrations will suffice. At our great gatherings for professional advancement "clinics" are given which are purely mechanical demonstrations. Inlay technique, casting methods, the flow of solder and countless other bits of bench work are shown as "clinics." Speaking with the proper meaning and origin of the word in mind as well as the millennium-old interpretation given it by the medical profession, the use signified is a gross misapplication. Doubtless a medical scholar would arch his brows at the dental employment of it, the purist would gasp dismayedly, but while many of us wish profoundly that the word were not so used it will doubtless go on in dental usage until the dictionary will be compelled to add another definition to those now given. It might soothe the least bit to remember that other fields have appropriated the word. Note that the law school advertises the big city as a realm of opportunity for "legal clinics."

The word "dead" as applied to pulpless teeth will serve our purpose as another illustration. No one knows how long the word has been so used; no one can tell how long it will continue to be so employed. It seems an utter waste of time and energy to raise a jeremiad about it, but it has been termed dangerous and pernicious and editorials have been penned against it. It is a misnomer for the condition to which it is applied, but what is the remedy? The word "pulpless" has been suggested and

without doubt is much more accurate, but also without doubt it will be easier to add a new definition to the dictionary. Then we shall have to trust to the context to give the definition of the word when used. Entering the argument for the moment it is safe to say that to tell when a tooth is dead is next to impossible, as anyone knowing its structure will testify, and although we are told that teeth may remain *in situ* for indefinite periods after all attachment is lost, we are within the limits of safety in assuming that a tooth is scarcely dead so long as it remains in the mouth. Nature's treatment of dead tissue is positive, unmistakable, and its verdict to be trusted. Ask the pathologist or surgeon how it differs from the tolerance afforded a pulpless tooth.

As misnomers these words travel in classic company. In every department of science are words that are either synthetically incorrect or have added an ever-lengthening list of definitions. Two words are outstanding illustrations of this statement. "Cell," describing the physiological and anatomical unit of animal structure, was born in the brain of a botanist; later it was adopted by an anatomist. With the advance of science it was found to be a misnomer. Other words synthetically and etymologically correct as well as anatomically correct have been suggested but were stillborn. Notice also "evolution." Originally it was applied to a specific theory of the origin of life. It suggested a preformed, invisible, rudimentary structure corresponding part to part with the adult form. Then came the rival doctrine of epigenesis and since an ever-widening circle of implication until today the word is suggestive of every possible process of development. One must be well read indeed to state the various meanings of this aristocrat of terms.

We have some advantages and some disadvantages in the development of a nomenclature, but the advantages outweigh the disadvantages. We have a rich, full terminology from which to draw. It is our right so to draw. We have the long history of medicine for



guidance; we ought to accept guidance. We are young, scarcely in our youth as age in terminology goes, and we ought to be careful, very careful. At this time we ought to put on the accuracy and dignity that speak of sanity and wisdom if we desire the adoption suggested before, or, not wanting adoption, recognition.

We have come into some prominence as a gainful profession, a newly-rich profession so to speak. Likewise have riches of importance in the great field of pathology fallen to us. We have felt ourselves hurried to name the children of the great parent pathology and so have devised names—as is often done in the homes that would have distinction—Maryannas, Gloryannas *et al.* if you please. Likewise we have essayed to attach high-sounding names when simpler forms were many times more effective and free from etymological entanglements. To illustrate here is to be reprobated. But does it not savor of the display attempted by the returning fresh-

man before his gaping *confrères* of pre-college days? Is not there a garishness about it that ill becomes maturity and wisdom? Again, illustrations are easy, but we fear they may stir excitability.

Doubtless when a man writes for publication he deems himself equal to the occasion that calls him, but it appears plainly enough without quoting from a very wide range of dental literature that to many who write and speak the contribution or address is an opportunity for exploitation or jest. It evolves, then, that the reduction of garishness and blare of unnecessary noise falls in a very full measure upon the editorial staffs of the accredited dental publications. It is our privilege in these days of our growth to build a sound vocabulary that will not need a speedy and humiliating revision. This implies confidence in the men to whom our publications are entrusted and a profound need of the work devolving upon the Committee on Nomenclature.

30 N. MICHIGAN AVE.

# CORRESPONDENCE

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## "Radiographic Evidence."

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TO THE EDITOR OF THE DENTAL COSMOS:

*Sir*,—I desire to reply to the communication by Dr. C. Edmund Kells in the September Cosmos, relative to my July contribution on the subject of whether or not to extract unerupted impacted teeth.

To begin with, Dr. Kells is in error when he says that my film showed a beautiful example of "where an impacted and unerupted tooth should not be extracted." Anyone with experience in reading X-ray films—and I am sure that Dr. Kells knows better than his statement indicates—has seen how one angle would show an impacted tooth overlapping the tooth it is impacted against, while another angle might show a definite space or interval between the erupted and the impacted tooth. Referring further to my July contribution Dr. Kells says: "His first film showed undoubted extensive abrasion (not resorption) of the second molar. Under these circumstances I have extracted, and will also do so in the future, the absolutely ruined second molar, whereupon the good and sound third molar will in time (it may take three years, it may take ten years) come down and possibly take the place of the second molar."

Evidently Dr. Kells does not like to use the word resorption, but how can one speak of a thing being abraded without evidencing the phenomena of resorption? When a tooth surface becomes abraded, is there not substantial resorption? But this is only a minor fault to find with Dr. Kells' communication. I see greater fallacy in his argument that my first film showed undoubted extensive abrasion of the second molar. I deny this with all the force

of my professional experience and judgment. I claim that for a man to make a diagnosis so positive as Dr. Kells proceeds to make, is acting without proper appreciation of the phenomena I have referred to in the preceding paragraph of this communication, namely, that varying angles of incidence of rays produce apparently varying degrees of tooth relationship. The third molar in the film referred to might have been situated buccally or lingually to the second molar.

I extracted the impacted unerupted third molar because it was evidently the cause of the pain the patient desired to be relieved of, and when the second film showed that the distal wall of the second molar had become extensively hollowed out by the pressure of the third molar against it during the effort of the third molar to erupt, I then extracted the second molar as well. This I believe to be good surgical judgment and, if anything, Dr. Kells' reply in criticism to my course has confirmed me in my opinion that I have followed the correct technique.

Of course I do sometimes recommend the retention of the unerupted third molar and the sacrifice of the second molar, but in these instances I am governed by considerations, such as age of patient, decayed or infected state of the second molar, angle of crown of unerupted third molar, etc.

Dr. Kells should not be so shocked at my remark about teeth which are unerupted being constantly in motion. This is no new theory. Every cell in our body is constantly in motion in the constant metabolic processes which we term life. When the tissue changes cease we note the phenomenon of death. Why be

so surprised, therefore, when I make the simple assertion that unerupted teeth are constantly in motion? Are not the fully erupted teeth constantly in motion? Is it not the occlusion of tooth with tooth and maxillæ with mandible which keeps the teeth in their normal relationship with one another and do we not note the elementary phenomenon of tooth changes just as soon as an opposing tooth is lost, or a neighboring tooth is removed from the same arch? No, Dr. Kells, I have not discovered this "continuous motion!"

I have only one more statement to add, and that is this: The retention of

unerupted impacted teeth, even when they do no apparent harm or cause no painful disturbance, is especially contraindicated where prosthetic restorations are to be inserted, because I have never seen it fail that the pressure produced by the prosthetic appliance has caused acute symptoms to be conveyed by the impaction, and surely we must have in mind the necessity for prosthetic restoration when we consult with our patients on their surgical needs.

Truly yours,

M. HILLEL FELDMAN, D.D.S.  
616 MADISON AVE., NEW YORK CITY.

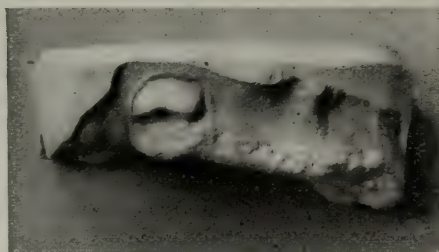
## Eruption of Third Molar at Eighty Years.

TO THE EDITOR OF THE DENTAL COSMOS:

*Sir*,—About three years ago I reported a case of the eruption of an upper third molar in the mouth of a physician from a nearby settlement; you then asked me for an impression.

Recently the doctor called again and complained of pain in the region of the right third molar tooth. I secured an impression as illustrated. He has but two teeth remaining in the maxilla, the left cuspid and first bicuspid. He has been wearing a partial denture since about 1900.

The doctor is in active practice, a rather extensive rural one. He is tall and slender, but very active.



Erupting third molar. Dr. H., age eighty.

I thought this of sufficient interest to report.

C. R. SCHOLL.

SECOND NATIONAL BANK BLDG.,  
READING, PA.

## An Anomalous Premolar.

TO THE EDITOR OF THE DENTAL COSMOS:

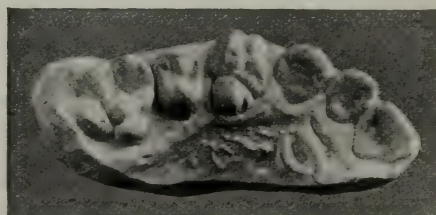
*Sir*,—I am sending to you the model of a peculiar premolar which came under my notice a short time ago. (See Figure.)

The molar also has an extra cusp; all the other teeth are normal. This tooth cannot be called a "bicuspid."

Yours truly,

F. M. NEWELL, D.D.S.

TACOMA, WASH.





# PROCEEDINGS OF SOCIETIES

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## The Eastern Association of Graduates of the Angle School of Orthodontia.

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Eleventh Annual Meeting, held in New York City, May 3 and 4, 1920.

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(Continued from page 1261.)

### MONDAY—*Afternoon Session.*

President Johnson called the meeting to order at 2 o'clock.

THE PRESIDENT. The following have been appointed as a committee to consider the problem of undergraduate instruction, in accordance with the motion of Dr. Mershon: Drs. Hatfield, Hawley, Murless, Kemple, and Kelsey.

The first item on the program for the afternoon session was a paper by Dr. J. LOWE YOUNG, New York City, entitled "The Development of the Third Molars as Revealed by the Radiograph."

[This paper will be published in a later issue of the DENTAL COSMOS.]

THE PRESIDENT. We will now hear from Dr. ARTHUR L. MORSE, who will read a paper on "Laboratory Training and Orthodontic Technique for the Undergraduate."

[This paper will be published in a later issue of the DENTAL COSMOS.]

Adjourned until Tuesday morning.

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### TUESDAY—*Morning Session.*

Dr. Johnson called the meeting to order at 9.45 A.M.

The President announced as the first item on the program for the morning session a paper by Dr. CHARLES HOWELL TAVENER, New York, entitled "Mechanics as Applied to Orthodontia."

[This paper will be published in a later issue of the DENTAL COSMOS.]

It was moved and carried that a vote of thanks be extended to Dr. Tavenor for his excellent paper.

The next item on the program was a paper by Dr. F. C. KEMPLE, New York, entitled "Orthodontic Limitations."

[This paper is published in full on page 1327 of this issue of the DENTAL COSMOS.]

### DISCUSSION.

Dr. H. K. Hatfield. *Mr. President*, a short time ago a criticism of the proceedings of this society was passed along to me comparing them to the passing out of a cook-book to a hungry tramp. Is there anyone here today who believes that? I think not. The starved critic who made this comparison I believe to be figuratively dead, so no matter.

The activities of this society, I believe, are always carried on with the view of advancing scientific knowledge and determining facts of practical value to orthodontia. Too often, no doubt, facts have been confused with follies or follies mistaken for facts. For example, many times at our meetings and from time to time in the magazines, results of treatment are exhibited as finished products, when the retainers have but recently been moved, and the teeth are still staggering, perhaps, under the stress of treatment, assuming at this time that an occlusion has been established and the case cured: at the same time particular kinds of appliances are shown for which quite positive claims are made regarding their

effectiveness in producing these ideal results. This is the folly, and the fact is that the value of treatment is not determined by the particular means employed, but by the end result. The directness and speed of our progress in any field of work obviously depend on the correctness of our leads. On two occasions, to my knowledge, Dr. Kemple has taken leads which I believe to be not only in the right direction, but of unusual practical value and significance. His paper on early treatment has been alluded to by some one of the contributors in his testimonials as a more pessimistic picture than conditions justify. That does not seem to me to be the point. What we want is the truth. In that paper Dr. Kemple produced evidence which proved to the satisfaction of many of us that many so-called diagnostic signs of impending malocclusion were largely surmises and assumptions. The claim is that we continue to treat cases on the assumptions. Largely as a result of this paper a clearer distinction is made today between a case of retarded development and conditions of malocclusion.

Today he produced evidence to show that this ideal conception of normal occlusion, as a standard to be realized in each individual case, has failed to withstand the test. This evidence, placed beside the material that has been presented before this society from time to time showing that a universal reign of harmony exists throughout nature, makes it of inestimable value. It is a singular thing that the orthodontist should be the last in the departments of medicine to cling to this idea of perfection, this possibility of realizing the ideal in all cases, even when his case is started at birth. Here, as Dr. Kemple has quoted, is a "fanatic faith wedded to a falsehood." He has traced this conception to the pictures mentioned and the textbooks, but I believe it has a more ancient origin. Since the assertion was made by someone that "man was made after God's own image," this idea of the perfection of man has been entertained until quite recent years. The oculist has seen the light; he recognizes normal variations. He improves functional conditions with a permanent

lens adjusted; he does not attempt to produce the ideal eye.

The orthodontist attempts an ideal reconstruction and in some instances adjusts a permanent retainer. But this is not likely to be universally adopted; so the orthopedist recognizes structural as well as functional variation, and he does not attempt to bring about ideal conditions. He reconstructs the part with the idea of bringing about the best functional condition that is consistent with the materials he has in hand.

It is time we survey and acknowledge our orthodontia limitations, or, in other terms, normal variations.

**Dr. Milo Hellman.** New York City. Dr. Kemple deserves to be complimented on the stand he is taking in presenting a topic of this character. It requires more courage to admit one's limitations than to exhibit one's capabilities. We are all conscious of the effects of gratification experienced upon the successful completion of an orthodontic case; we are equally affected with discouragement by an unsuccessful result. While we cherish the elation of the former, we are dismayed by the thought of the latter. It is consequently the successes that are so frequently dwelt upon in our meetings and in our literature, while the failures are almost entirely disregarded. The reason thereof is that while we are all eager in winning praise for a skilful deed, we are too timid to take the blame for a failure—even if it be unavoidable.

Is there any disgrace in the exposition of our shortcomings? Life as a whole is replete with examples of limitation. If it were not for this, all living beings would soon reach a stage where life as such would be impossible. For instance, if all fifteen million eggs laid by the conger eel were to develop, and in turn reproduce, in two years the sea would be a wriggling mass of fish.

A single infusorian produced in seven days 935 descendants. One species, *stylonychia*, produced in six and a half days a mass of protoplasm weighing one kilogram. At the end of thirty days, at the same rate, the number of kilograms would be one followed by forty-



four zeros, or a mass of protoplasm a million times larger than the sun.

Another minute organism, *hydatina*, produces about thirty eggs. At the end of a year (sixty-five generations), if all the offspring survived, they would form a sphere whose limits would extend beyond the confines of the known universe.

The omnipresent English sparrow would produce in twenty years, if none died except of old age, so many descendants, that there would be one sparrow for every square inch of the State of Illinois. Even slow-breeding man has doubled his number in twenty-five years. At the same rate, there would in 1000 years not be standing room on the surface of the earth for his offspring.

These calculations were picked up at random and could not all be vouched for, but whether they are entirely correct or only partially so, they give a rough idea at least of the stupendous power of growth.

There are, however, limits to all this. Nature, in her wise manipulations, has put three checks to limit this process: First, the food supply is insufficient, *i.e.*, we starve; second, animals eat each other, *i.e.*, we feed; third, substances are produced by the activity of the body itself that interfere with its powers of growth, *i.e.*, we poison ourselves. "The laws of food supply and the appetites of the enemies," says T. H. Morgan, "are as inexorable as fate." Is there any wonder, then, that in the sphere of activity of the orthodontist there should also be limitations? If it were otherwise, it would be an unnatural phenomenon.

Regarding the paper as a whole, it may be said that, like orthodontia itself, it also has some limitations. For instance, the arguments would have gained in conviction if Dr. Kemple had compiled in figures the number and character of results affected by the limitations mentioned, and contrasted them with those which were free from them. He would have shown then that while creditable results are obtainable under certain favorable conditions, failures are inevitable when we are confronted with insurmountable limitations. Moreover, he should have pointed out more specifically

the nature of those limitations that hinder the orthodontist in the attainment of ideal results in all cases of malocclusion.

In my estimation orthodontic limitations may be divided into three general classes:

- I. Limitations due to the shortcomings of orthodontic therapeutics,
- II. Limitations due to the shortcomings of patient, and
- III. Limitations due to the shortcomings of the orthodontist.

I. Without going into detail, it may be further emphasized that the limitations due to the shortcomings of orthodontic therapeutics are caused by:

1. *Unmeasurability* of the potential energy vested in an appliance; *i.e.*, the amount of force an appliance will deliver cannot be definitely determined. As a result, appliances have been observed to produce:

- a. Excessive irritation instead of
- b. Mild stimulation.

2. *Uncontrollability* of all possible directions of the potential force of an appliance; *i.e.*, an appliance may be made and adjusted for a particular purpose and while accomplishing it, also displays unexpected properties. Namely of

- a. Accomplishing what we wish it to, besides doing other things desirable and undesirable, also,
- b. Doing other things, desirable and undesirable, without accomplishing what we desire,
- c. Accomplishing desirable results despite prevalent adverse conditions, and
- d. Accomplishing undesirable results despite the most favorable conditions.

3. *Inscrutability* of design of an appliance for avoiding all damaging influences by its presence alone; *i.e.*, appliances recommending themselves for their design with special reference to producing by their presence:

- a. No damage to tooth structure,
- b. No irritation to the soft tissues surrounding the teeth and appliances,
- c. No undesirable habits.

II. Limitations due to the shortcomings of the patient again may be said to



be divisible into *controllable* and *uncontrollable* causes.

Limitations due to uncontrollable causes are found in such conditions of malocclusion that are associated with hereditary characters; such as, nervous disturbances and idiosyncrasies of growth associated with certain peculiarities of some tissues.

Limitations due to controllable causes are again divided into those of intentional and those of unintentional character. The latter may be observed in the willingness of the patient to cooperate with the orthodontist, but owing, for instance, to certain habits of mastication or respiration, the effective influence will be interfered with.

Those belonging to the second type intentionally interfere with the appliances. The manner in which it is accomplished is well known to all present. Thus, the intentional removal by the patient of the appliance in part or *in toto* is not unknown to the orthodontist, regardless of how carefully adjusted and securely attached. The chewing of sticky molasses candies will invariably distort the appliances if indeed it will not break or dislodge them. But besides these, children are also known to chew such substances as lead pencils and penholders which cannot be said to be very conducive to the proper working of the appliance. Lack of cleanliness and laxity in keeping of appointments are other limitations affecting orthodontic endeavor.

III. Limitations due to shortcomings of the orthodontist may be named under the following captions:

1. Insufficient knowledge of the significance of the normal, and the consequent wrong deductions as to what constitutes the "Normal in Occlusion" as distinguished from the "Ideal."
2. Insufficient knowledge of pathologic manifestations,
3. Insufficient knowledge pertaining to the causes of malocclusion.
4. Insufficient knowledge of the effects upon vital tissues produced by various degrees of the force exerted by the different mechanical devices employed.
5. Insufficient knowledge pertaining to the most propitious time for the treatment of orthodontic cases.

6. Total lack of knowledge of other stimuli besides mechanical appliances to produce similar manifestations in growth. In other fields of work growth has been shown to respond to chemical as well as physical stimuli by acceleration and retardation in rate and extent.

In conclusion it may be said that only upon a keen perception of these limitations will we realize our own. And in proportion as our limitations will be fully revealed to ourselves, our efforts to overcome them will be stimulated. Let us therefore interpret the purpose of Dr. Kemple's paper by the assumption that his intentions were, *not* to justify mediocre results, *not* to encourage slovenly work, *not* to change our opinion of the high standard of orthodontic ambition. His purpose is rather an endeavor to point out the high ideals of orthodontia and emphasize the fact that like all other manifestations of vital processes also our specialty has its limitations. It is therefore our duty to mold the future of orthodontia into such form as to overcome all criticism of an adverse nature. Viewed from this aspect, Dr. Kemple's paper ought to serve as an efficient stimulus for our future ambitions.

**Dr. F. A. Gough, Brooklyn, N. Y.**  
*Mr. President and Fellow Members,*—It seems to me that Dr. Kemple has overlooked a danger which lies in this kind of a paper. The young man may need to be warned that he should not expect ideal results in all cases of malocclusion treated, and to that extent the paper may have served a useful purpose, but there is a real peril to the community in a paper written by an orthodontist of Dr. Kemple's reputation which it seems to me lowers our ideals and debases our standards. There are too many men practicing orthodontia without having proper preparation who will joyously welcome such a paper as offering an excuse for the poor results they obtain to allow this paper to go unchallenged.

It opens the door for easing the conscience of those who do slovenly work. A large percentage of failures, as Dr. Hellman has shown, are doubtless due to lack of care on the part of the orthodontist because of poor technique on ac-

count of an overcrowded practice affording insufficient time to do justice to each case, or to some other cause that lies entirely within the power of the operator to overcome. We need to strive to find out what the reason is for failure and correct it, instead of merely contenting ourselves with the idea that our failures are due to certain limitations. Such limitations are by no means as frequent as Dr. Kemple's paper would lead us to infer. His paper impresses me as one that tends to discourage further efforts toward higher standards or better methods or efforts toward improving our specialty.

**Dr. J. A. Cameron Hoggan**, Richmond, Va. *Mr. President*, my first experience in orthodontia impressed me with the fact that I had no ideal of normal occlusion, and it took me some time to form an ideal. I assume that we are all much better if we have an ideal in any direction; we struggle toward this goal. There is no man who has yet reached perfection. I am not sure that there is anyone here who deserves it, but that is no reason why there should not be such a thing as paradise or any reason why we should discard the hypothetical occlusion. We must have some vision of normal occlusion. The average orthodontist can produce a better average occlusion than is found in nature.

In the models Dr. Hellman showed he recorded a certain new position for the teeth. He admits he treated the case three times, but did not solve the problem. This does not prove that the teeth could not be placed in a position in which they would stay. It merely shows his limitations—not the limitations of orthodontia. Your limitations and my limitations are human limitations, not orthodontic limitations.

I like Dr. Kemple's way of approaching this subject, and while I do not believe the result we obtain is so bad as he states, I believe in stating the worst side and the best side of a question before we make analyses. I believe that it is better for us to treat some cases ten years

than that we should lower our ideals in regard to occlusion.

**Dr. J. Lowe Young**, New York City. I do not agree with Dr. Hoggan. I do not like the way in which Dr. Kemple approached this subject, for the reason that he has set up this ideal, this hypothetical ideal occlusion. I have never seen a case treated by anybody that came up to that ideal hypothetical occlusion; I have never seen a skull that came up to that hypothetical ideal occlusion; I do not believe it is fair to say that we could arrive at that ideal hypothetically perfect occlusion. Dr. Hellman speaks of perfect developments. I wish to say there is no such thing as a normal man and there never was any such thing as a perfectly normal occlusion—he has never seen one in his life. We have our limitations, of course; we have lots of them in a specific way, but we should not in a great big sweep admit imperfections for which there is no necessity.

**Dr. R. H. W. Strang**, Bridgeport, Conn. I wish to lay emphasis on the position which Dr. Young has taken. The character of the work which we are engaged in is such that we must be idealists or we will degenerate. In striving for the ideal we are bound to make many mistakes. It would indeed be dangerous if we failed to admit such shortcomings, comforting ourselves with the thought that we were dealing with case limitations and therefore could not have done better. Yet that there are limitations is known and recognized by all of us. Unfortunately, I believe that the greatest percentage of our failures is not due to limitations, but to errors in treatment. The study of our cases previous to treatment is apt to be superficial. Particularly is this so in relation to the overbite problem. It is one of the most important of the symptoms that occur in malocclusion, and unless detected and corrected will necessarily lead to failure.

Therefore let us not be too ready to seek refuge in the knowledge that imperfect results may be due to limitations in treatment, but rather let us so perfect



our knowledge and technique as to reduce our imperfect results to that type of case alone, comparatively few of which will be found in our individual practices.

**Dr. Kemple** (closing the discussion). I am very glad to have presented this paper. The discussion has brought out exactly the point that I wished to have stated in public, namely, that ideal occlusion of the human teeth is so rare that some of us who have been in the practice of orthodontia for twenty years have never seen it in the living subject. And yet we have gone on year after year speaking of "normal occlusion" in the sense that it was synonymous with "ideal occlusion." We have gone on re-treating many of our cases, after the retaining appliances have been off for six months or a year, because some of the teeth have settled into a position that does not meet with our conception of ideal occlusion. And for the same reason we have gone on advising the treatment of cases in which the degree of malocclusion is relatively slight, perhaps less than it may be after the so-called correction is complete.

Dr. Hellman referred to the fact that my statements have been general and not detailed or classified. I made them general for the purpose of introducing the subject and bringing about a discussion. I intentionally refrained from going into detail in the hope that without it the subject might be more freely discussed. The details and classification of limitations may be taken up later by some other essayist. There is ample material for detailed discussion, and in my opinion the subject is entitled to much more exhaustive study and discussion than it has received here today. In introducing a classification of limitations, Dr. Hellman referred to therapeutic limitations, limitations of patients, and limitations of the orthodontist, but I do not believe he intended to limit his classification to these three; I do not believe he meant to imply that, with these three limitations overcome or eliminated, we could

in each and every case produce *ideal* physiological development or *ideal* occlusion. But with these three limitations out of the way we could, in many cases, come much nearer what might be called the individual normal in our final results than we do at the present time.

Dr. Gough and Dr. Strang spoke of the danger of "lowering our ideals," and Dr. Young spoke of "opening the door for all kinds of indifferent work" by admitting the limitations referred to in my paper. In regard to lowering our ideals, I believe this is a hobgoblin that has no existence. If our ideals are impractical and unattainable and harmful they had better come down. In regard to "opening the door for indifferent work," this recalls an incident that occurred at one of the meetings of the American Society of Orthodontists several years ago at which Dr. Lourie was on the program to read a paper on the subject "Compromise Treatment." In that paper Dr. Lourie advocated the judicious extraction of one or more teeth in certain extreme cases of malocclusion, and when certain members heard of this they did not want the paper read or published, because they feared "it would open the door to indiscriminate extraction." But the paper was read and was published, and I have not heard of any indiscriminate extraction in orthodontia as the result of it. There are men who will do "sloppy," inferior work in spite of all the ideals that may be preached to them, and there are others who will do the best they can under any and all circumstances—it is simply the difference in the type of man.

The "ideal hypothetical occlusion" spoken of by Dr. Hoggan is all right as an ideal, but let us call it an ideal. We cannot warp facts to make them conform to a preconceived ideal. Carved in the granite on the front of the Public Library over on Fifth Avenue are these words: "But above all things else truth beareth away victory."

Adjourned.



# THE DENTAL COSMOS

A MONTHLY RECORD OF DENTAL SCIENCE.

*Devoted to the Interests of the Profession.*

EDWARD C. KIRK, D.D.S., Sc.D., LL.D., *Editor.*

L. PIERCE ANTHONY, D.D.S., *Associate Editor.*

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PHILADELPHIA, NOVEMBER 1920.

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## EDITORIAL DEPARTMENT

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### Dental Nomenclature.

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THE necessity for a systematized nomenclature of technical terms in the science and art of dentistry has for decades been strongly impressed upon those who are largely concerned in recording in the literature the progress and advancement of the profession. The development of the science of dentistry is going forward at such a rapid pace that the accepted terminology, which has more or less imperfectly served its purpose in the past, no longer meets the demands of the researcher and writer in their endeavor to convey in a clearly understandable manner many of the results of their efforts.

The requirements of the technical nomenclature of any science in so far as its historical record is concerned are that it shall be an accurate literary transcript of all the discriminating thoughts and manifold experiments involved in the development of that

science, and judged from that standard our present dental nomenclature falls far short of such requirements.

Words are primarily intended to definitely convey the thoughts of the speaker or writer to the reader or hearer, and in any science the necessity for a clear precise terminology is to a large degree in direct ratio to the procedures, methods, materials and experiments it is called upon to descriptively convey from one person to another. In the developmental stage of a science, its nomenclature in the nature of the case represents the peculiar modes of thought and expression in vogue during its formative stage, and this is particularly true of dentistry because of the fact that in the early period of its evolution from a handicraft into a science it was peculiarly modified by the individual influence characteristic of the time. The element of secrecy which surrounded each practitioner's methods of procedure, the materials and instruments with which he worked, evolved a nomenclature which served the purpose of the individual, but was directly opposed to the object set forth above, and it therefore failed of scientific accuracy. The object then was to prevent anyone from knowing what material or instrument he used and how he used it. It was not long, however, before this attitude of secrecy and mysticism gave way to the scientific spirit of helpfulness and it then became necessary that an attempt be made at standardization of dental terms to give them self-evident meaning and thus meet the new requirements in the dissemination of knowledge.

The first notable effort to meet this demand in America was made by one who may be rightfully termed the father of modern dentistry, Dr. Chapin A. Harris, when he gave to dentistry his "Dictionary of Dental Science" in 1849. This monumental work served its purpose well until dentistry outgrew its swaddling clothes and demanded a more elaborate nomenclature in order that its followers might be enabled to convey to their fellow practitioners and to students in a more intelligible manner an understanding of the increasing number of technical procedures.

The next serious effort to meet the ever-pressing demand in the field of nomenclature came from the appointment of Dr. G. V. Black by the authorities of the World's Columbian Dental Congress to present a report on the subject before that body in 1893. The report which Dr. Black subsequently presented was epoch-making

indeed and stands today as a monument to his intellectual ability and indefatigable energy and is a most prominent landmark in the history of dental nomenclature.

Dr. Black may truthfully be said to have wrought order out of chaos in this field and the principles upon which to base a sound dental nomenclature as enunciated by him were universally accepted by the dental world. It may be added further that of the numerous words suggested by Dr. Black in the report and later in his "Dental Anatomy" only two that we can recall failed to attain an established place in dental terminology. Dr. Black's efforts were ably augmented by those of Dr. S. H. Guilford in the field of Orthodontia and Dr. George H. Wilson in the field of Prosthetic Dentistry. Indeed, so well did they perform their task that little serious effort was made in this direction until recently and that only in special phases of the subject, notably that by the National Society of Periodontists.

There have, however, been individual efforts to coin new words to meet new needs and while some of these words have been good and acceptable others have been chosen with little regard for appropriateness or for the rules of etymology. So much so has this been the case that we are meeting almost daily many of what the editor of the *National Dental Association Journal* has termed "glass diamonds," whose unsoundness is as certain as their etymological origins are uncertain. Such individual efforts, however, inevitably lead to confusion in the use of several words to mean the same thing rather than confining a single term to a single thing and using that term only.

As an example of the absurd extent to which this may be carried, we cite only one instance, namely, the product of the X-ray procedure, which has been variously called radiograph, radiogram, skiagraph, roentgenograph, roentgenogram, and X-ray, without regard to distinction between the film and the print made from it.

It is strikingly apparent that the average dental practitioner is utterly indifferent to this important phase of our literature, seemingly being content with and almost demanding that this subject be dealt with by those concerned with the historical record of dentistry in the literature, teachers, writers, editors, etc. In recognition of this demand, negatively expressed by the indifference of the general practitioner and in recognition of the need for re-



newed effort in this direction, the subject was discussed at a meeting of dental editors held in Boston during the time of the recent National Dental Association meeting, and a committee was appointed to consider ways and means of stimulating further interest in the systematization of effort in the direction of improved dental nomenclature.

There is no question that the various individual efforts in this direction should be coördinated, but the efforts of whatever committee may have this matter in charge should receive the authoritative sanction of the representative organizations of the profession if they are to be of permanent value and to the end that we may be saved from the burden of further indignity and confusion of results arising from the use of such etymological monstrosities as have unfortunately in the past been foisted on an unsuspecting and long forbearing profession.

Another unfortunate condition with which we have to contend in stabilizing our terminology is the fact that we are lacking the recognized and effectual medium of placing our terminology before the profession, through the avenue of an accepted distinctly dental dictionary. We are compelled to rely upon the medical dictionaries to perform that function and all are impressed with the ineffectiveness of this method, as the most dependable medical dictionaries we now have fall far short of meeting our requirements for technical dental terms.

The varied and intricate operations and procedures in dental practice demand a nomenclature capable of expressing the refinement and differentiation of meanings peculiar to dentistry which can only be supplied by an ample and discriminating technical terminology, and to this end may we hope that the efforts of the American Institute of Dental Teachers to publish a strictly dental dictionary may be stimulated to the point of fruition.

The scientific status, exactness of knowledge, cultural developments and mental habits of the profession are distinctly reflected by its nomenclature and the retarding influence of insufficient and defective vehicles of expression must be removed if we are to keep pace with the other learned professions.

## An Index of Dental Literature.

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AN index of the English periodical literature of dentistry is being compiled and published under the auspices of the American Institute of Dental Teachers and direction of Dr. Arthur D. Black, who has undertaken the task of indexing the subjects purely as a labor of love for the advancement of dental literature. The work has reached such a stage of forwardness that the Secretary of the Institute is now in position to receive subscriptions for the first instalment of the Index, that comprising the years 1911 to 1915 inclusive. The preparation of the volume covering the years 1916 to 1920 is also well under way and is being supported financially by the National Dental Association.

The index is to be published in volumes covering five-year periods as rapidly as the enterprise can be financed, until the index is brought up to date. The index is planned after the Dewey Decimal system comprising subject references and author references, forming a complete and concise index of reference to the entire English periodical literature of dentistry, and should be in the hands of every practitioner, writer and student of dentistry. In the completed work there will appear subject references to some forty thousand articles with author index giving a complete record of the contributions of each author to the progress of dentistry.

We sincerely hope that it is needless for us to call attention to the value of such a work to every practitioner of dentistry and we bespeak for this praiseworthy undertaking the cordial support of the profession.

The work will be issued by subscription only and the Secretary of the Institute, Dr. Abram Hoffman, 381 Linwood Ave., Buffalo, N. Y., is now ready to receive subscriptions. The first volume will be issued at a cost of \$6.00 and the succeeding volumes at a price commensurate with the cost of issuance.

It is necessary for Dr. Hoffman to know how many copies are needed before the work of publication goes forward and to that end we urge everyone who desires a copy of the index to send his subscription with accompanying check for \$6.00 to Dr. Hoffman at the above address as promptly as possible.

## PRACTICAL HINTS

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This Department specially welcomes the brief presentation by our readers of any novel suggestions or methods which in their own practice have proved to be time-saving or to possess other features of advantage.

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### To Remove Inlay Patterns from Teeth in Hot Weather.

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By AARON CHURCH, D.D.S., New York City, Dental Department New York Clinic for Speech Defects.

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WHEN the temperature is up in the 90's, it is often quite a problem to remove the wax pattern from the cavity without distorting it in some way, especially so if the inlay is a very large restoration.

The writer has found that the ethyl chlorid spray can be used to considerable

advantage. After the pattern has been carved, spray some ethyl chlorid on the wax; this will cool and harden the wax. Then warm the pin and insert in the wax; allow to cool and remove the pattern.

143 E. THIRTY-SEVENTH ST.

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### How Do You Prevent Green Stain?

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By W. H. SAVAGE, D.D.S., Clifton Forge, Va.

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MARY B. is an intelligent conscientious miss of fifteen, and has been under the writer's dental supervision for ten years. The tendency to the accumulation of green stain has been quite noticeable for several years. Both she and her mother have repeatedly asked how to keep it off, always with the positive assurance that the outlined directions as regards brushing were being followed.

A few months ago, several fillings being needed as well as a thorough cleaning, the work was purposely extended over a few weeks. The stains were care-

fully removed. In as short a time as two weeks the condition was as bad as ever.

Distressed and conscious of his ignorance, after failing to get any information from his reference works (Fones, Pickerill and "System of Dentistry"), the writer reasoned in this way: I am not a chemist, but I do know that green stain will etch or roughen enamel surface; this, evidently, is the result of the solvent action of some acid. Presumably, as in the treatment of chemical erosion, an antacid is indicated.

Another good cleaning was given the



teeth and milk of magnesia prescribed with which to rinse the mouth after brushing the teeth before retiring at night.

It was suggested that this be used for a few weeks consecutively, discontinuing for a while, and resuming as indicated.

The green stain problem has been solved.

Do others know of this? If so, why has the writer failed in reading his journals for so many years to glean this practical item? Stick a pin here: Mere brushing will sometimes fail to keep off green stain.

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## Attaching Single Substitutes to Molars with Short Crowns

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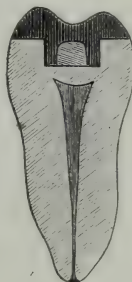
By C. W. RATCHEFF, D.D.S., Chicago, Ill.

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WE often meet cases where it is desirable to attach a substitute to a gold crown. When the abutment piece is long, such cases are generally satisfactory and durable. But the attempt at a like procedure on teeth with short crowns often proves disappointing, as the appliance soon loosens and falls out.

In all such cases better results are obtained by using what may be called the crown-inlay unit or abutment, which is essentially a cast-cusp crown slightly modified in order to obtain good retention. This modification consists simply in preparing a four-walled or oval occlusal cavity, of sufficient depth [as shown in the diagram]. The sprue may be attached to the wax from the inside, and the excess of gold subsequently drilled out and the resulting cavity filled

with cement. The proof that an appliance so constructed will stay in position will become evident when the case is tried in just before cementation.



In view of the durability of the case and the saving of the adjoining tooth from possible mutilation, the practitioner is entitled to demand an increased fee.

817 W. ADAMS ST.

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## Protecting a Fractured Incisor.

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By W. A. JAQUETTE, Philadelphia, Pa.

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A CHILD nine years old fractured the upper left central incisor, which had a very thin cutting edge. The pulp was not exposed, but the break extended very

close to it. The tooth was extremely sensitive to thermal change and it was desirable to protect it. The adhesiveness of cement would not be sufficient for re-

tention; cutting would endanger the pulp, so a platinum band was pinched and cemented to the crown, filling the band over the area of the pulp. Before the band was cemented, however, the ex-

posed dentin was thoroughly cleansed with chloroform, and coated with acetone and thymol. When the acetone was evaporated a varnish was used.

FIFTEENTH AND LOCUST STS.

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## Method of Obtaining a Pure Culture from the Apex of an Extracted Tooth.

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By THEODORE D. CASTO, D.D.S., Philadelphia, Pa.

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A METHOD of obtaining a direct culture from the apex of an extracted tooth free from contamination by the flora of the mouth is very essential, if the dentist is to give the medical adviser correct data to assist in the diagnosis of a particular case.

During the years of 1913-14 I had many cultures made at the Mt. Sinai Hospital Dental Clinic from apices of teeth and from pockets around the teeth. A report of the bacteriological findings and the method of procuring the cultures was published in the *Therapeutic Gazette* of September 1917.

The mixed growth found in the cases at that time caused me to devise a method that would give a smear on the culture media directly from the suspected area where radiolucency was shown.

The following method has proved very satisfactory in its results: The region from which the tooth is to be extracted is painted with iodine or Talbot's solution of zinc iodide. This should always be done before probing pyorrhea pockets or extracting teeth. The metal saliva ejector is placed in the mouth, and the field of operation is carefully surrounded by gauze or cotton rolls; then a solution of acid phenol-sulfonic or some dehydrating agent is wiped over the tooth and pressed around the gum border until it is cauterized or changed to whiteness. The patient is now anesthetized by

nitrous oxide and oxygen, the forceps carefully flamed and the tooth extracted.

For making cultures from the apex of the extracted tooth glucose blood-sugar agar-agar has proved an excellent medium. Instead of the usual test tubes for holding slants of the agar, American Stender dishes have been used. These dishes are 50 mm. deep and have fairly well-fitting covers. The dish is half filled with the liquid culture medium, and after cooling and hardening the medium is ready for use. After extracting the tooth lift the cover of the Stender dish, and while the upper portion of the tooth is still held firmly in the forceps make several stabs or implantations from the apex of the tooth directly into the culture medium.

The usual bacteriological precautions should be observed during the operation and the lid of the dish must be immediately replaced and sealed with adhesive plaster after making the cultures. The Stender dish is then placed in an incubator at a temperature of 37.5°C. and held there for forty-eight hours before a study is made of the bacterial flora. A twenty-four-hour incubation period is not sufficiently long for all the bacteria to develop satisfactorily.

Autogenous vaccines, if desired, may readily be made from the growth thus obtained.

1831 CHESTNUT ST.

# REVIEW OF CURRENT DENTAL LITERATURE

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[*Lancet*, London, May 22, 1920.]

## **Perfect Dentition in Old Age.** BY J. O. BUTCHER.

Patient, a woman of eighty-four years. Dentition complete except right maxillary second molar, which was extracted at the age of eighty-two years. Occlusion excellent. Apparently no "pyorrhea alveolaris." Almost no dental caries.

[*Münchener Medizinische Wochenschrift*, May 7, 1920.]

## **Comparative Frequency of Vincent's Angina.** BY BIEROTTE.

Smears of 216 consecutive cases among the military, sent mostly for diagnosis of diphtheria, showed presence of Vincent's infection in twenty (9.26%). Seven of the 216 were sent with suspicion of Vincent's angina, which was justified in four.

[*Journal of Laryngology, Rhinology, and Otology*, London, July 1920.]

## **Dental Cysts of the Superior Maxilla.** BY MAURICE SOURDILLE.

In order to avoid the inconvenience and danger of the long persistence and slow obliteration of an open cavity communicating with the oral vestibule after the current (Partsch) operation, the upper bony partition which separates the cyst from the nasal fossa or the maxillary antrum is resected. The two lips of the wound in the mouth are brought together. The packing of the cavity during the succeeding days and its drainage during repair is effected by the nasal or antro-nasal route.

The closure of the vestibular wound, however, may not be permanent, in which case there would be free passage from the mouth to the antrum or nasal fossa. Such cases of bucco-nasal fistula are not rare, but may be corrected by a plastic operation (flap from

upper lip or cheek). The details of this are illustrated by reference to a single case.

[*Journal of Infectious Diseases*, August 1920.]

## **Noma in the Dog.** BY J. McI. PHILLIPS AND FRED. BARRY.

The noma developed immediately after a mild attack of canine distemper. The microscopic picture was striking on account of the great number of fusiform bacilli and spirilla. Smears from gums of normal dogs from the same kennel showed often Vincent's organisms, but usually in relatively small numbers. Eighteen months later quite similar results were secured.

This short report has two interesting features. It suggests the use of dogs as experimental animals in the study of Vincent's infection, and the possibility of contagion of Vincent's organisms from dogs to man.

[*Journal of Dental Research*, March 1920.]

## **Disinfection (Bacteriostasis) of the Oral Mucosa with Crystal Violet and Brilliant Green.** BY C. COLEMAN BERWICK.

The purpose of these investigations was to find an antiseptic which would be efficient and yet which would be relatively innocuous to the normally sensitive mucous membrane of the mouth. Alcohol, acetone, ether and tincture of iodine were, after direct trial on the human mucosa, discarded because of the resulting dehydration, with blistering, burning and lowering the local resistance of the tissues. Bacteriological tests were carried out with various dyes in various dilutions upon microorganisms ordinarily encountered in the mouth. The suggestions so obtained were applied clinically to a series of eight cases, belonging to the field of dental or oral surgery. Berwick's conclusions follow:

Brilliant green and crystal violet, in solu-



tion together (one per cent. of each in fifty per cent. alcohol) are very efficient, mild antiseptics. This combination has very little, if any, harmful effect on the delicate oral mucosa.

Clinical observations indicate that these dyes together in alcohol act not only as an antiseptic, but also as a mild stimulant to newly forming granulations, both by keeping down contamination by oral organisms and by either destroying or inhibiting the growth of organisms initially present.

Some of the clinical findings are interesting. The penetration and diffusion of the dye is considerable. In every instance in the author's experience the case was benefited by this treatment. Extractions, old discharging sinuses and old infections yield completely to treatment. This, however, appears to have no lasting beneficial effect upon pyorrhea. The only result obtained was merely a temporary diminution in the severity of the symptoms.

No reference is made in this report to the effect of these dyes upon salivary secretion. In determining the worth of any medicament applied to the oral mucosa, the question whether or not it inhibits or stimulates salivary flow is not to be neglected.

[*British Journal of Surgery*, April 1920.]

**Trigeminal Neuralgia: Injection of Alcohol into the Gasserian Ganglion.** By H. H. RAYNER.

A concise report of twenty cases (two non-epileptic form). Hartel's technique (through foramen ovale) closely followed. Two cases developed trophic corneal ulceration; one of these left a dense corneal opacity. Three cases were injected "more than two years" before this report: two of these still completely free from neuralgia; in the other relapse after six months.

[*Journal of the National Dental Association*, August 1920.]

**Indications and Contra-indications for Nerve-Blocking Anesthesia.** By F. F. MOLT.

#### INDICATIONS.

- (1) Impactions in general, and especially of mandibular third molars.
- (2) Except in the case of complete or al-

most complete alveolectomy, in which cases ether is often preferable, the surgical removal of extensively abscessed teeth (*cf.* Novitzky, *DENTAL COSMOS*, December 1917 and April 1919, p. 340; also *Journal of National Dental Association*, June 1918, pp. 555-64) is better done under nerve blocking.

(3) The extraction of devitalized mandibular and maxillary molars, even in absence of apical involvement but where the tooth may shatter.

(4) Extensive infection is no contra-indication, because the needle may be inserted into healthy tissue at a point distant from the affected part.

#### CONTRA-INDICATIONS.

(1) Where epileptic tendencies are known to be present.

(2) Heart lesions in advanced stages and in cases of arterio-sclerosis and high blood pressure.

(3) Anemic patients or those of very low vitality.

(4) In most cases, nerve blocking is contra-indicated in children (*cf.* Farr, *DENTAL COSMOS*, September 1919, p. 902).

[*Journal of the National Dental Association*, June 1920.]

**Resorption of Apex and Fibrosis of the Pulp.** By GUTHRIE MCCONNELL.

Bacteria are so frequently the direct cause of disease, especially of oral disease, that other etiologic factors are often ignored. Talbot in a series of studies (*DENTAL COSMOS*, 1919) has stressed the fact of the importance of other factors. McConnell's contribution may be a clinical illustration of Talbot's experimental findings. There was marked resorption of the apical third of the dentin and cementum of the tooth. No filling in the tooth (but McConnell does not state whether or not there was a cavity). Vital to electrical testing. Vital pulp, histologically, with marked central fibrosis. The absence of plasma cells and of polymorphonuclear leukocytes would seem to indicate the absence of infection, but unfortunately no cultures were taken. Also unfortunately no roentgenograph of the tooth is shown. This would have been particularly instructive in view of the presumed absence of infection.

# OBITUARY

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## Dr. William J. Younger.

DIED. in Paris, France, on Friday, July 23, 1920, WILLIAM JOHN YOUNGER, M.D., D.D.S.

Dr. Younger was born in Santiago, Chile, October 9, 1838, of British parents. At the age of ten years his parents removed to San Francisco, Calif., where Dr. Younger received his education and grew up a citizen of the United States.

Dr. Younger, after finishing his academic education, entered the Medical Department of the University of the Pacific, from which institution he received the M.D. degree in 1862. He later received the *ad eundem* degree from the Cooper Medical College, San Francisco. Dr. Younger began the practice of medicine soon after his graduation, but in a short time devoted himself to the practice of dental surgery, making a specialty of the treatment of diseases of the mouth and teeth, and also of oral deformities. For several years he held the Chair of Dental Medicine in the Medical Department of the University of California.

Dr. Younger removed to Chicago in 1897 and in 1900 he went to Paris, France, and there established himself, where he continued to practice until he retired a few years before his death. Dr. Younger was a prominent member of the American colony in Paris for over twenty years. He attained world-wide renown for his skill in the treatment of pyorrhea alveolaris and for the operation known as the "Younger operation," which consists in the implantation of teeth in artificially formed sockets in the jaws. This latter operation was first publicly demonstrated at the Ninth International Medical Congress in Washington in 1887 and was pronounced by the President of the Congress, Surgeon-General Hammond, "as the original operation of the Congress of that year."

Dr. Younger was widely known both in Europe and America and succeeded in building up a very large practice, which included many of the royal families of Europe. He

was a prolific writer and contributed numerous articles to dental literature on almost all phases of dental practice. He was a member of many medical, dental, and other scientific societies, and was highly esteemed for the active interest that he took in the advancement of medicine in dentistry. Dr. Younger possessed a pleasing and attractive personality which won for him many friends, both in and out of the profession, to whom he endeared himself by his genial and kindly nature and gentlemanly characteristics.

Dr. Younger was a member and one of the founders of the San Francisco Dental Association; the Stomatological Clinic Club of San Francisco, and the California State Dental Association. He was a member of the Société de Stomatologie de Paris; the Fédération Dentaire Internationale; the American Dental Club of Paris, and the American Dental Society of Europe. He was at one time President of the California State Board of Dental Examiners; the San Francisco Dental Association; the California State Dental Association; the Midwinter Dental Congress of the Pacific; the Stomatological Club of San Francisco, and the American Dental Club of Paris. He was also a member of the San Francisco County Medical Society; the California State Medical Society; the Chicago Odontological Society, and the American Medical Association. He was also a member of the American Club of Paris; the Automobile Club of France; the Bohemian Club of San Francisco; Knights Templar California Commandery No. 1, and Knight Kadosh 32d Scottish Rite. Dr. Younger was also honorary member of numerous dental societies in the United States and Chile.

Dr. Younger is survived by his widow and two daughters. The funeral services were held in Paris, Monday, July 26, at the American Church of the Holy Trinity. His body will rest in the mortuary chapel of the Holy Trinity Church and later be interred in the cemetery at San Francisco, Calif.

## "In Memoriam" Resolutions.

**Dr. Jesse Cope Green.**

RESOLUTIONS adopted by the Dental Society of Chester and Delaware Counties September 22, 1920, on the death of Dr. Jesse Cope Green:

*Whereas*, Dr. Jesse Cope Green passed from this life July 26, 1920, in his one hundred and third year, as the result of a fall, and

*Whereas*, Dr. Green's professional life covered practically the whole period of organized dentistry, and he was an active participant in matters concerning the development of the profession, and

*Whereas*, His optimistic view of life, his active interest in the welfare of the community in which he lived, his technical ability to construct instruments of precision.

whether for recording meteorological conditions or for use in his chosen profession; his ripe experience in affairs generally, coupled with his kindness of heart and positive character and his youthfulness of spirit retained throughout his long life, made it a privilege to know him. Therefore be it

RESOLVED, That we, the members of the Dental Society of Chester and Delaware Counties, do record our deep sense of the loss that we have sustained; and be it further

RESOLVED, That we extend to the family our heartfelt sympathy, that these resolutions be spread upon the minutes of the Society and published in the dental journals and a copy be sent to the family of our departed member.

WADEA KASSAB,  
ROBERT MILLER COX,  
S. B. LUCKIE, *Chairman*.

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# ARMY AND NAVY DENTAL NEWS

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## United States Civil-Service Examination. DENTIST.

RECEIPT OF APPLICATIONS TO CLOSE  
NOVEMBER 23, 1920.

THE United States Civil Service Commission announces an open competitive examination for dentist. Vacancies in the Indian Service at Large at \$1500 a year plus increase granted by Congress of \$20 a month, and vacancies in positions requiring similar qualifications, at this or higher or lower salaries, will be filled from this examination, unless it is found in the interest of the service to fill any vacancy by reinstatement, transfer, or promotion.

*Traveling expenses, etc.*—The Office of Indian Affairs states that in addition to the salary mentioned, the incumbents in these positions will be allowed actual necessary traveling expenses, including sleeping-car fare, incidentals, and subsistence when actually employed on duty in the field. All dental supplies and instruments are furnished by the Government. Employees will have no fixed place of abode, but will be required to travel from school to school as the needs of the service require.

*Age.*—Applicants must have reached their twenty-first but not their fortieth birthday on the date of the examination. Age limits do not apply to persons entitled to preference because of military or naval service.

*Retirement.*—Classified employees who have reached the retirement age and have served fifteen years are entitled to retirement with an annuity.

*Applications.*—Applicants should at once apply for Form 1312, stating the title of the examination desired, to the Civil Service Commission, Washington, D. C.; the Secretary of the United States Civil Service Board, Customhouse, Boston, Mass., New York, N. Y., New Orleans, La., Honolulu, Hawaii; Post Office, Philadelphia, Pa., Atlanta, Ga., Cincinnati, Ohio, Chicago, Ill., St. Paul, Minn., Seattle, Wash., San Francisco, Calif.; Old Customhouse, St. Louis, Mo.; Administration Building, Balboa Heights, Canal Zone; or to the Chairman of the Porto Rican Civil Service Commission, San Juan, P. R.

Applications should be properly executed, including the medical certificate, but excluding the county officer's certificate, and must be filed with the Civil Service Commission, Washington, D. C., prior to the hour of closing business on November 23, 1920.

*Issued October 8, 1920.*



## Appointments.

### Army Dental Corps.

The War Department announced on September 3d, the following appointments:

Captains: Albert L. Alexander, Lakehurst Proving Ground, N. J.; Clyde W. Allen, Camp Sherman, Ohio; Daniel Bratton, Camp Zachary Taylor, Ky.; Arthur G. Buehler, Hoff General Hospital, Staten Island, N. Y.; Harold H. Buehler, Hoff General Hospital, Staten Island, N. Y.; Joseph E. Eden, Camp Taylor, Ky.; James B. Harrington, Fort Jay, N. Y.; Herbert E. F. Tiesing, Camp Mercedes, Tex.

1st-Lieuts.: Robert C. Craven, dental unit 1. Camp Grant, Ill.; Jay R. Haskin, Camp Funston, Kans.; Edward J. Kubesh, U. S. Military Academy, West Point; Harry T. Ostrum, Fort Logan, Colo.; Earle Robbins, camp hospital, Marfa, Tex.; Hugh J. Ryan, post hospital, Fort Ontario, N. Y.; Melville A. Sanderson, post hospital, Ft. Andrews, Mass.; Oscar W. Thompson, camp hospital, Camp Taylor, Ky.

The following were announced on September 4th:

Captains: Roy L. Bodine, Walter Reed Hospital, Washington, D. C.; Joseph D. Eby, Walter Reed Hospital, Washington, D. C.

The following were announced on September 7th:

1st-Lieuts.: Albert Fields, 214 W. 8th st., Pittsburg, Kans.; Rufus W. Leigh, Cedar City, Utah; Arthur B. McCormick, 825 Main st., Waltham, Mass.

The following were announced on September 11th:

Major: Fred H. Saunders, O'Reilly General Hospital, Oteen, N. C.

Captains: Waldo J. Adams, Camp Normoyle, Tex.; Thos. J. Cassidy, 25th Inf., Douglas, Ariz.; Richard C. Hughes, Camp Hospital, Camp Grant, Ill.; Victor P. Klapacs, Base Hospital, Fort Bliss, Tex.; Robert E. Motley, 40th and Spruce sts., Philadelphia.

1st-Lieuts.: Emory C. Bardwell, Camp Abraham, Va.; Roy L. Denson, Camp Benning, Ga.; Arthur C. Foard, Walter Reed General Hospital, Washington; Earl G. Gebhardt, Camp Grant, Ill.; Everett H. Ruggles, 45th Infantry, Camp Dix, N. J.; William E. Sankey, Camp Hospital, Camp Pike, Ark.; Ernest F. Sharp, Lawson General Hospital, Atlanta, Ga.; Victor L. Shepard, Camp Hospital, Camp Jackson, S. C.; W. S. Shuttleworth, U. S. Dis. Bks., Ft. Leavenworth.

The following were announced on September 13th:

Captains: Ernest P. Dameron, Jefferson Barracks, Mo.; Clarence W. Johnson, Base

Hospital, Fort Bliss, Tex.; John S. Ross, 6th Corps Area, Chicago, Ill.; Thomas L. Spoon, Att. Surg. Off., Washington, D. C.; Roy A. Stout, Post Hospital, Fort Oglethorpe, Ga.

The following were announced on September 14th:

Major: John M. Evey, Camp Grant, Ill.

1st-Lieut.: Lemuel P. Woolston, Base Hospital, Fort Bliss, Tex.

The following were announced on September 15th:

Captains: Daniel J. Crowley, 730 Broadway, West Somerville, Mass.; Edwin St. C. Wren, 25 S. 5th st., Reading, Pa.

1st-Lieut.: Thomas F. Davis, Camp Hospital, Camp Bragg, N. C.

The following were announced on September 16th:

1st-Lieuts.: Frank A. Crane, Aberdeen Proving Grounds, Md.; Wm. J. Crydermann, 25th Infantry, Camp Little, Ariz.

## Assignments.

### Army Dental Corps.

#### *Week ending July 24th.*

Lieut.-Col. Robert F. Patterson from duty at Camp Dix, N. J., to Camp Gordon, Ga., for duty as camp dental surgeon.

1st-Lieut. Charles P. Johnson, honorably discharged.

#### *Week ending July 31st.*

Capt. Roy C. Starr, from duty at Army and Navy General Hospital, Hot Springs, Ark., to New York, and about August 18th to Panama Canal Department for duty.

Capt. Fletcher D. Rhodes, from duty at Jefferson Barracks, Mo., to Hot Springs (Ark.), Army and Navy General Hospital, for duty.

Capt. Clarence J. Wright, from duty at Camp Lee, Va., to Arcadia, Fla., Carlstrom Field, for duty.

1st-Lieuts. Clarence M. Haskell, Richard S. Payne, and Allie Y. Russell, honorably discharged.

#### *Week ending August 7th.*

1st-Lieut. Chester B. Parkinson from duty at Fort Miley, Calif., to San Francisco and to Panama Canal Department for duty.

#### *Week ending August 14th.*

Maj. John W. Scovel from station at Fort McHenry, Md., to San Francisco, Letterman General Hospital, for duty.

Maj. Samuel W. Hussey, Capt. Frank L. Cooper, honorably discharged.

Maj. Lee B. Schrader from duty at Camp Gordon, Ga., to Fort Sill, Okla., for duty.

Capt. Lynn H. Tingay from duties at Camp Gordon, Ga., to Fort Monroe, Va., for duty.

Capt. George R. Ellis from duties in Washington to Camp Gordon, Ga., for duty.

1st-Lieut. James J. Weeks from duty at Fort Sheridan, Ill., to attending surgeon's office, Washington, for duty.

1st-Lieut. Harry Holmes transferred from Lawson General Hospital, Atlanta, Ga., to Walter Reed General Hospital, D. C., for observation and treatment.

*Week ending August 21st.*

Lieut.-Col. Robert F. Patterson, at Camp Gordon, Ga., report to Fifth Division for duty as division dental surgeon.

Maj. Eugene Milburn from duties at Fort Monroe, Va., to Camp Gordon, Ga., for duty.

Maj. Charles C. Mann from duties at Columbus Barracks, Ohio, to Fort D. A. Russell, Wyo., for duty, relieving Capt. William B. Stewart, who will proceed to Fort Leavenworth, Kans., for duty.

Maj. Frederick R. Wunderlich from duty at Camp Zachary Taylor, Ky., to Camp Funston, Kans., Seventh Division, for duty as division dental surgeon.

Capt. Milton A. Price from duty at McCook Field, Dayton, Ohio, to Fairfield, Ohio, Wilbur Wright air service depot for duty.

Capt. Roger L. Dill, 1st-Lieut. Leigh J. Woodworth, honorably discharged.

1st-Lieut. Page P. A. Chesser from duties at Walter Reed General Hospital, D. C., to Camp Benning, Ga., for duty.

*Week ending August 28th.*

Capt. Neale Ross at Fitzsimons General Hospital, Denver, Colo., is transferred to station hospital, Fort Sam Houston, Tex., for observation and treatment.

1st-Lieut. Kenneth M. Kern, honorably discharged.

*Week ending September 4th.*

Maj. Richard F. Doran, honorably discharged as major, Dental Corps, in emergency forces, to accept temporary commission as emergency officer in lower grade; appointed captain, Dental Corps, temporarily in emergency forces.

1st-Lieut. Harry T. Ostrum from duty at Fort Logan, Colo., to Camp Pike, Ark., for duty.

1st-Lieut. Egbert W. Van D. Cowan from duty at Camp Taylor, Ky., to Camp Gordon, Ga., for duty.

1st-Lieuts. Edward Barbour, Fred M. York, honorably discharged.

# DENTAL COLLEGE COMMENCEMENTS

## University of Minnesota, College of Dentistry.

At the annual commencement exercises of the College of Dentistry of the University of Minnesota, held in Minneapolis, Minn., June 17, 1920, the degree of Doctor of Dental Surgery was conferred on the following graduates:

Bergliot Aass  
N. T. Ahmann  
C. B. Bang  
E. L. Bergan  
J. K. Blunt  
B. K. Braum  
J. W. Bryant  
B. J. Brzenski  
S. O. Bylund  
M. J. Cohen  
W. P. Crolley  
C. F. Donaldson  
L. V. Downing  
C. D. East  
E. C. Fogarty  
V. B. Francis  
T. C. Glanz

M. W. Goldberg  
Ernest Grumstrup  
H. H. Hagen  
R. V. Hanson  
G. Y. Hildebrand  
F. M. Howe  
R. G. Ioset  
R. F. Ioset  
R. A. Jacobson  
F. S. James  
C. H. Jamieson  
A. E. Johnson  
E. L. Johnson  
R. M. Johnson  
A. L. Katz  
H. A. Kehne

G. B. Kellett  
R. M. Kraft  
Benjamin Lan  
L. J. Landers  
H. O. Larson  
M. E. Lawler  
L. H. McCray  
N. J. Marxen  
C. D. Mitchell  
M. C. Mohn  
Helga Myklebust  
A. L. Nelson  
D. L. Nellermeoe  
O. T. Olson  
L. T. Oster  
A. E. Prechel

M. W. Quigley  
H. C. Rawson  
P. A. Risk  
D. E. Rodman  
J. A. Salisbury  
C. H. Schwedes  
J. F. Sprafka  
P. S. Taylor  
M. H. Thornton  
A. T. Tomasek  
W. J. VonBank  
P. B. Wiberg  
L. F. Will  
L. F. Witter

### McGill University, Department of Dentistry.

At the annual commencement exercises of the Department of Dentistry of McGill University, held in Montreal, Can., the degree of Doctor of Dental Surgery was conferred on the following graduates:

H. E. Adams	W. T. Donnelly	A. N. Jenks	C. T. Parker	S. J. Schachter
J. S. Common	L. S. Eidinger	W. G. Leahy	I. N. Pesner	A. L. Walsh
J. Dance	J. Fineberg	S. A. MacSween	B. Ratner	

### Northwestern University Dental School.

At the annual commencement exercises of Northwestern University Dental School, held in June 1920, in Chicago, Ill., the degree of Doctor of Dental Surgery was conferred on the following graduates:

Bernard Auerbach	Wilfrid I. Dinan	Donald McL. Hinman	Melvin A. Root, Jr.
Arthur W. Berndt	Herbert J. Dunn	Harry H. Kamins	Abel E. Schwartz
Nicholas R. Brahy	Watson A. Dodge	Joseph F. Kerwin	Alfred H. Siedenbergl
William H. Brown	Conrad E. Eastwold	William R. Ludwig	Thomas C. Starshak
Olga R. Buttner	Clyde D. Eshelman	Harry P. Macey	William J. Strauss
Frank E. Cardio	Robert R. Fosket	Harry A. Monson	Kendall S. Tillotson
Robert R. Church	Clarence M. Grandson	Harry J. Riegel	Myron B. Walling
Elroy F. Cigrand	Joseph L. Gruesen	Benjamin A. Roman	Russell R. Williams
Chester O. Deason			

## SOCIETY NOTES AND ANNOUNCEMENTS

NOTICES should reach the Office of the DENTAL COSMOS *not later* than the 11th or 12th of the month preceding that of publication.

### Dental Protective Association of the United States.

THE annual meeting of the Dental Protective Association of the United States will be held in the Palmer House, State and Monroe sts., Chicago, Ill., on the third Monday of December, the 20th, 1920, at 4 P.M. sharp.

The report of the officers will be given, a board of directors will be elected, and such other business will be transacted as should come before the association.

All members are urgently requested to be present.

By order of the Board of Directors,

J. G. REID, *President*,  
E. W. ELLIOT, *Vice-Pres. and Sec'y*,  
D. M. GALLIE, *Treasurer*.

### University of Iowa, College of Dentistry.

THE University of Iowa, College of Dentistry and Dental Alumni clinic will be held at the dental building, Iowa City, Iowa, November 12, 1920.

JOHN VOSS, *President*,  
Dental Alumni Assoc.  
Iowa City, Iowa.

### Chicago Dental Society.

JANUARY 27, 28, and 29, 1921, are the dates of the fifty-seventh anniversary meeting of the Chicago Dental Society. A cordial invitation is extended to members of all recognized dental societies.

M. M. PRINTZ, *Sec'y*,  
25 E. Washington st., Chicago, Ill.



### Seventh District (N. Y.) Dental Society.

THE midyear meeting of the Seventh District Dental Society of the State of New York will be held Saturday, November 20, 1920, at the Rochester Dispensary.

F. J. SHADDOCK, *Sec'y*,  
Rochester, N. Y.

### Ohio State Dental Society.

THE fifty-fifth annual meeting of the Ohio State Dental Society will be held in Memorial Hall, Columbus, November 30, December 1 and 2, 1920, and will extend over three full days, closing Thursday afternoon. An excellent program of papers, lectures, and clinics has been provided, to which all members of other State societies are cordially invited. It is advised that hotel reservations be made as far in advance as possible.

F. R. CHAPMAN, *Sec'y*,  
305 Schultz Bldg., Columbus, Ohio.

### Nebraska Board of Examiners.

THE Nebraska State Board of Dental Examiners will hold their next examination in Lincoln, Nebr., November 15th to 19th. For information and application write

H. H. ANTLES, *Sec'y*,  
Department of Public Welfare.  
Lincoln, Nebr.

### Maryland Board of Examiners.

THE Maryland Board of Dental Examiners will meet for examination of candidates for certificates on November 10, 11, and 12, 1920, in Baltimore at the Baltimore College of Dental Surgery at 9 A.M.

For application blanks and further information apply to

F. F. DREW, *Sec'y*,  
701 N. Howard st., Baltimore, Md.

### Connecticut Dental Commission.

THE Dental Commissioners of Connecticut will meet at Hartford, Conn., November 18, 19, and 20, 1920, to examine applicants for license to practice dentistry, to examine dental hygienists to practice, and to transact any other business proper to come before them.

For further information address

ROBERT H. W. STRANG, *Recorder*,  
886 Main st., Bridgeport, Conn.

### Illinois Department of Registration and Education.

THE Department of Registration and Education will hold an examination for dentists in Chicago the week commencing Monday, November 15, 1920.

The written work will be held in the city hall, beginning 8.30 o'clock Monday morning. The practical work will be held at the University of Illinois, College of Dentistry, 1838 West Harrison st.

Application, properly filled out, together with high school credentials and examination fee of \$20, must be on file in this office not later than November 5th.

Attention is called to the requirements regarding the photograph and dental diploma, which must be presented on the first day of the written examination.

F. C. DODDS, *Supt. of Registration*,  
Springfield, Ill.

### California Board of Examiners.

THE next meeting of the Board of Dental Examiners of California for the purpose of examining applicants for a license to practice dentistry in that State will be held in the city of Los Angeles, Calif., beginning on December 6, 1920, at 9 A.M. Each applicant shall file with the secretary of the board fifteen days before that date the following credentials: (1) Diploma or certificate of graduation from a reputable dental college approved by the board; (2) a diploma from an accredited high school or a certificate signed by a State superintendent of public instruction (or similar officer) to the effect that the applicant has had scholastic preparation equivalent in all respects to that demanded for graduation from a high school giving a four years' course of instruction. In lieu of high-school credentials, an applicant who has been a licensed practitioner of dentistry of some other State of the United States for a period of at least five years shall file such license or licenses; which will be accepted; (3) a testimonial of moral character; (4) a recent unmounted photograph of the applicant.

For further information address

C. A. HERRICK, *Sec'y*,  
133 Geary st., San Francisco, Calif.

### New Jersey Board of Registration.

THE State Board of Registration and Examination in Dentistry of New Jersey will hold their regular examination in the State-house, Trenton, N. J., December 6, 7, 8, 9, and 10, 1920. License fee, \$25; re-examination fee, \$10.

Practical tests required: Insertion of an approximal gold filling with the approximating tooth in position, compound approximal amalgam filling, and a silicate filling—candidate must furnish his own patient. Taking of impression, bite, selection of teeth, articulation, trial plate—candidate must furnish his own patient. Practical examination in mouth diagnosis.

Attention is directed to the following quotation from the dental law of New Jersey: "Applicant shall present to said board a certificate from the commissioner of education of this State, showing that before entering a dental college he or she had obtained an academic education consisting of a four-year course of study or the equivalent thereof." In accordance with this law the secretary will issue application blanks only upon presentation of the required certificate from the Commissioner of Education, State-house, Trenton, N. J.

Applications must be filed complete ten days before the date of the examinations. Address all communications for further particulars to

JOHN C. FORSYTH, *Sec'y*,  
429 E. State st., Trenton, N. J.

### State of Idaho Bureau of License.

THE next examination for dentists will be held in Boise, Idaho, on January 11, 1921. For application blank and law pertaining to this profession address Bureau of License, Boise, Idaho.

PAUL DAVIS, *Director Bureau of License*,  
Boise, Idaho.

### Colorado Board of Examiners.

THE Colorado State Board of Dental Examiners will meet for the purpose of examining candidates for license to practice Dentistry and Oral Hygiene in Colorado, at

Denver, Colo., at the State-house, beginning December 7, 1920, 8 A.M.

For further particulars and application blanks address

R. C. QUICK, *Sec'y*,  
310 Metropolitan Bldg., Denver, Colo.

### Rhode Island Board of Registration.

THE regular semi-annual meeting of the Rhode Island Board of Registration in Dentistry for the examination of candidates will be held in the State-house, Providence, R. I. All applications with the proper fee must be filed one week previous.

For further information address

ERNEST A. CHARBONNEL, *Sec'y*,  
334 Westminster st., Providence, R. I.

### South Dakota Board of Examiners.

THE next meeting of the South Dakota Board of Dental Examiners will be held in Sioux Falls, S. D., January 11, 12, 13, and 14, 1921, beginning promptly at 9 A.M., Tuesday, January 11th. All applications must be in the hands of the secretary by January 1, 1921. Fee for examination, \$25; no reciprocity or interchange. Full information and application blanks may be had by addressing

L. R. WALSTON, *Sec'y*,  
Redfield, S. D.

### National Mouth Hygiene Association.

#### SUSPENSION OF DEPARTMENT OF EXTENSION LECTURES.

THE Department of Extension Lectures and that of Army and Navy Educational Work of the National Mouth Hygiene Association have been suspended.

Applications for Lecture rentals also suspended, and the sale of Lecture "A" sets discontinued.

Holders of Lecture "A" sets may purchase extra slides or manuscripts from Underwood & Underwood, 417 Fifth ave., New York City.

EDWIN N. KENT, D.M.D.,  
*Director of Extension Lectures*,  
158 Newbury st., Boston, Mass.

# UNITED STATES PATENTS

## PERTAINING TO OR APPLICABLE TO DENTISTRY

ISSUED DURING SEPTEMBER 1920.

### *September 7.*

- No. 1,352,080, to FELIX C. MONTUORI. Dental casting machine.
- No. 1,352,395, to WALTER S. WRIGHT. Dental mandrel for holding stones and sandpaper disks.
- No. 134,493, to CHARLES DIERKE. Trade-mark for toothbrushes.
- No. 134,499, to THE DENTAMINA TRADING Co. Trade-mark for toothache remedy.
- No. 134,520, to NOVOCOL CHEMICAL MFG. Co. Trade-mark for local anesthetics.
- No. 134,522, to THE PEMETINE Co. Trade-mark for preparation for the treatment of the teeth.

### *September 14.*

- No. 1,352,614, to JOHN LEHNER. Suction mechanism for dental plates.
- No. 1,352,789, to JOSEPH E. CRAIG. Combined dental mirror and syringe.
- No. 1,352,995, to NATHAN M. STONE. Dental lamp.
- No. 1,353,019, to WILLIAM W. BOLLS. Pulp-canal file.
- No. 1,353,039, to LEON GREENFIELD. Anatomical bridge articulator.
- No. 134,614, to THE CLEVELAND DENTAL MFG. Co. Trade-mark for dental pliers, forceps, and rongeurs.
- No. 134,627, to THE DENTOCIDE CHEMICAL Co. Trade-mark for toothpaste.
- No. 134,767, to THE POLONIA DRUG Co. Trade-mark for liniments, medicines, remedies, toothache drops, etc.

### *September 21.*

- No. 1,353,199, to GEORGE H. WHITELEY, JR. Artificial tooth.

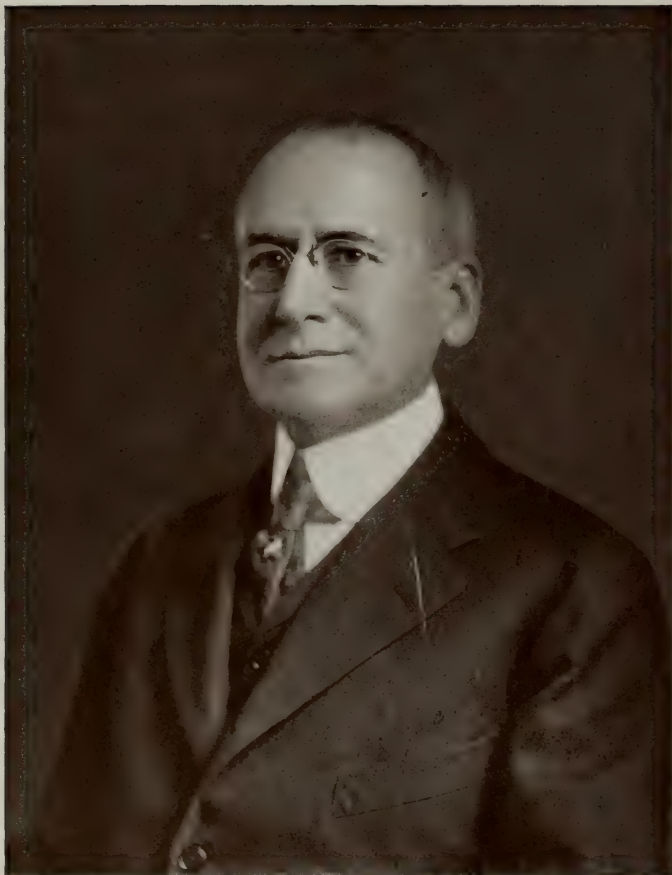
- No. 1,353,467, to JOHN F. FIETSCH. Device for measuring material for tooth fillings.
- No. 1,353,565, to ROBERT M. CRAIG. Process of making metallic denture backings.
- No. 1,353,587, to GEORGE D. HECK. Saliva ejector.
- No. 1,353,780, to MATILDA MUELLER. Tooth-brush.
- No. 134,891, to THE BAYER Co., INC. Trade-mark for analgesic and antipyretic.
- No. 134,892, to THE BAYER Co., INC. Trade-mark for analgesic and antipyretic.
- No. 134,927, to DENTAL PRODUCTS Co. Anesthetic tablets—trade-mark.
- No. 134,947, to FORSYTH DENTAL INFIRMARY FOR CHILDREN. Trade-mark for dentifrice.
- No. 134,957, to LOUIS H. GLOECKLER. Trade-mark for toothache remedies.
- No. 135,038, to A. E. PECK MFG. Co. Trade-mark for toothpaste and toothpowder.

### *September 28.*

- No. 1,353,942, to DELBERT A. AKIN. Dental flask and charger.
- No. 1,354,089, to HENRY CALLSEN. Dental tool.
- No. 1,354,139, to WILLIAM F. SHAW. Hand-piece.
- No. 1,354,454, to JAMES W. TALIAFERRO. Dental articulator.
- No. 135,190, to THE AMES-BONNER Co. Trade-mark for hair, tooth, and clothes brushes.
- No. 135,191, to ANDERSEN MEYER AND Co., LTD. Trade-mark for toothbrushes.







DR. WILLIAM G. EBERSOLE.

# THE DENTAL COSMOS

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VOL. LXII.

DECEMBER 1920.

No. 12

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## ORIGINAL COMMUNICATIONS

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### The Nervous Reflexes of Dentition.

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By EDWARD C. KIRK, D.D.S., Sc.D., LL.D., Philadelphia, Pa.

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(Read at the fiftieth anniversary meeting of the New Jersey State Dental Society, Atlantic City, N. J., July 14, 15, and 16, 1920.)

I THINK we all must recognize that revolutionary changes have taken place in dentistry during the past decade, changes so radical as to constitute a new epoch embodying an entirely new objective purpose in dental practice. I use the term revolutionary advisedly in this connection for no less forceful designation would, in my opinion, fitly define the radical character and suddenness of the change that has taken place, not only in modes of practice but more particularly in our conception of the principles which govern dental practice of the present as compared with that of a decade ago.

Broadly speaking, all revolutions consist of new ideals so translated into terms of action as to replace the old order and they succeed or fail accordingly as their animating impulse is based either in truth or in error, as the case may be. The ideal that has wrought such fundamental changes in the dentistry of the past and created the dentistry of today is our en-

larged conception of the meaning and our recognition of the importance of the relationships of oral sepsis.

#### THE NEW EPOCH.

The dental revolution was launched in October 1910 by Sir William Hunter in his address to the medical class at the opening session of McGill University Medical School, Montreal, in which epoch-making communication he brought under indictment the septic oral cavity, as well as the incidental features of ignorant and defective dental operations, as the *fons et origo* of a long category of systemic and organic disorders that constantly menace the health and life of the human race. Dr. Hunter's Montreal address was the culmination of scientific and clinical study of the subject of oral sepsis extending over the previous decade, his first communication bearing on the topic having been published in the July issue of the *British Medical Journal* for 1900. We may thus



regard the period from July 1900 to January 1911 as the period of preparation and the latter date as the launching of the idea of oral sepsis as the compelling force which has since wrought such fundamental changes in the practice of the whole healing art.

Hunter's Montreal address was a counter-irritant applied directly to the dental professional body, for it brought under indictment all carelessly and ignorantly performed dental operations, an indictment to which it was impossible to plead any other answer than "guilty," but it had the salutary effect of compelling a revision of dental technique in harmony with scientific, surgical and bacteriological standards. Moreover, it diverted attention from the mere mechanical and handicraft features of dental technique and focused the general interest upon the vital and pathological relationships of dental disorders and their restorative treatment. It installed therapy in place of mechanics as the primary dental professional ideal and made prosthesis the handmaid of therapeutics.

If any here feel that I have overstated the case, I can only suggest that they carefully consider the far-reaching effect upon dental practice that has resulted from our collective study of focal infections and the resultant change of views with respect to the salvability of pulpless teeth, or the reflex effect of this altered attitude upon the revival of dental prosthesis. Consider also the later viewpoint of the dental profession and of the medical as well toward the problems presented by dento-alveolar pyorrhea. We no longer regard a suppurative gingivitis as a merely local disorder whose worst eventuality is the loss of the natural teeth, but rather as a focus of infection that can initiate any number of acute or chronic disorders that may be a menace to life.

#### BACTERIA AND PATHOLOGY.

The outstanding result of all this later development due to our realizing sense of the importance of oral sepsis as the cen-

tral problem of modern dentistry is that our whole outlook on dental and oral pathology is now so beclouded with the data of bacteriology that we have seemingly almost come to believe that no pathological condition arises or can arise except through the agency of the omnipresent microbe.

That all pathological manifestations have or ought to have a germ origin has, to a large degree, come to represent the limits of pathological vision of many votaries of the healing art and to a large extent of the laity as well. So that belief in the germ origin of all disease is rapidly becoming an *idée fixe* among those who have in a sense been blinded by the brilliancy of the discoveries resulting from bacterio-pathological research.

I have neither the intention nor the desire to say anything that would tend to minimize in the slightest degree the immense importance of all that is compassed by the science of bacterio-pathology, its past achievements or future possibilities. I clearly recognize that "to know the cause is to know the disease," and, in so far as bacterio-pathology has brought to us the knowledge of disease causation, it has been the greatest benefaction of science to humanity. But what I desire to emphasize is that there is a wide range of pathological activities in which infection is in nowise concerned at least as a pathogenetic cause, disease phenomena whose effects and importance are equally as great as those which follow upon bacterial infection and which present as striking, not to say as dramatic, results in restoration to normality as any which follow the elimination of septic oral conditions.

#### DENTAL NEUROSES.

The group of disorders to which I desire to particularly direct your attention are those which arise from physical, non-septic irritation of the nerve endings in and about the teeth, and which I have collectively designated for the purposes of this discussion, the nervous reflexes of dentition.

When we refer to dentition, our minds usually picture the teething infant and we are inclined to restrict the application of the term to the period of evolution of the deciduous denture. But as a matter of fact, dentition considered broadly as the whole cycle of evolution of the masticatory mechanism proceeds continuously from birth until and after the third molars of the permanent denture are in functional position. Like many other physiological developmental activities of the organism the process of dentition shows distinct evidences of being rhythmical in character, that is to say, there is a manifest period of functional activity during the time that certain teeth or groups of teeth are forming and erupting which is followed by a period of rest intervening previous to the eruption of the succeeding group. The process of infant dentition may go on without pronounced symptoms of nervous irritation. It is rare, however, in any case that the teething infant fails at some stage of the evolution of its denture to manifest evidences of nervous stress or irritability more or less pronounced. It is not necessary to point out to this audience the phenomena which constitute the clinical symptoms of disordered or pathological infant dentition as these are sufficiently familiar to all who have had experience in dental practice or domestic life, but what I do wish to point out with some degree of emphasis is that the period of infant dentition is one of pronounced physiological activity, during which the teething infant passes through repeated stages of exalted nervous excitability more or less pronounced as each group of developing teeth pushes its way forward in the process of eruption. For lack of a more descriptive term, I have designated this period of nervous excitability in connection with the evolution of the infant denture as the period of dentitional stress.

#### THE DENTITIONAL EQUILIBRIUM.

Brief consideration of the developmental activities concerned in the growth and eruption of the teeth will recall to

your minds that in the normal evolution of the denture there is maintained a harmonious correspondence between the additions by growth to the developing roots of the teeth and the process of absorption of the tissues overlying the tooth crown as eruption of the tooth proceeds. This harmonious synchronism between root growth and tissue absorption is a delicately balanced mechanism, a sort of moving equilibrium, dependent for its stability upon the nutritional and physiological balance of the entire infant organism. We all know how easily the physiological balance of the infant may be disturbed especially during the teething period, the period of dentitional stress. Faulty hygiene, improper feeding, indigestion, physical irritation arising from improper clothing or abnormal temperature conditions, lack of sleep, etc., may so affect the growing organism during the teething process as to bring about inharmony between the root growth and absorption of the tissues overlying the tooth crown, thus causing a backward pressure by the undeveloped root end upon the dentinal papilla with any or all of the succeeding phenomena of pathological dentition as the result.

I have rehearsed this sequence of events in the evolution of the factors concerned in abnormal dentition because taken collectively they constitute the starting point in the production of a group of nervous reflex phenomena more or less serious in their consequences.

It is the total lack of understanding of the morbid anatomy of the parts involved in pathological dentition and the aberrations of function which it entails that leads the average physician to treat the case symptomatically, a method which in the absence of a knowledge of the primary cause inevitably leads to a wrong diagnosis and consequently to faulty treatment.

Let me recite a case in point:

J. H., an infant girl of twenty-two months, had erupted all of her deciduous denture excepting the last four molars. On several occasions I had lanced her gums when previously erupting teeth had been the source of pronounced nervous irritation and the opera-



tion was each time followed by complete subsidence of all symptoms. The nervous stress in connection with the erupting second molars had become increasingly pronounced; the child had passed through the stage of irritability, crying, and fretfulness characteristic of teething irritation and was in the stage of nervous exhaustion, which is the forerunner of convulsions. The appearance of the child was typical: paleness of the face, dark rings under the lower eyelids, pupillary dilatation, the vermillion of the lips intensely red; languid and weak when aroused but generally in a state of stupor bordering on coma; pulse feeble and quick, mind apparently clear and awake but responded to questions or attempts at diversions with weakness and manifest effort. There had been a history of slight constipation in the early stage of the trouble followed by offensive bowel movements and then a slight watery diarrhea.

Coincidentally with the onset of the stage of stupor and exhaustion there began an attack of vomiting which rapidly became cyclic in character and increased in frequency and intensity to a degree which rendered the taking of nourishment impossible. Food or fluid when ingested even in smallest amounts was instantly rejected by the intolerant stomach. The flow of urine was scanty and analysis revealed that it contained a large amount of albumin, some hyaline tube casts and pus cells, also acetone and indican in definitely marked amounts. Diagnosis of acute nephritis was made by the attending physician and treatment instituted for the relief of the condition.

Examination of the mouth revealed the four second deciduous molars unerupted, the upper advanced considerably beyond the lower. The gum tissue over the upper molars was freely divided with the lancet and as the child was manifestly relieved lancing of the lower molars was postponed for the time being to await results. She greedily drank half a pint of water and fell asleep for two hours of unbroken rest. I saw the case the following morning and learned that vomiting had recommenced after midnight. I therefore did what I should have done in the first instance, freed the crowns of the lower molars from pressure by dividing the overlying gum with the lancet. All symptoms promptly disappeared, the child took fluid and nourishment normally and the kidney condition cleared up completely in thirty-six hours. The connection between the teething irritation and the kidney involvement seems rea-

sonably clear. The irritation of teething that induced the reflex act of vomiting whenever water or food was ingested, deprived the system of the fluid necessary to dissolve and eliminate the toxic waste products of nutrition, which becoming more and more concentrated set up a direct chemical irritation to the delicate structure of the kidney cortex with the resulting acute nephritis. When the patient was able to ingest a normal amount of water, after the gum lancing had removed the primary dental irritation and thus eliminated the reflex vomiting, resolution of the kidney lesion promptly followed and the whole case became normal.

The causal reflex connection between a peripheral irritation of one of the cranial nerves and persistent vomiting in a child is well illustrated by a case the history of which was given to me in a private communication by Dr. James Grieves during his term as interne at one of the New York hospitals last year. A child who had been persistently vomiting for several days was brought to the hospital as a last resort, the attending physician having given up the case in despair. The case was subjected to a most searching physical and clinical examination and its diagnosis was about to be given up as insoluble when the idea that the vomiting might be reflex occurred to Dr. Grieves and on minutely re-examining the case with that thought in mind he discovered a foreign body in the shape of a bean so far down in the auditory meatus as to press upon the tympanum. On removing the bean with a delicate mouse-tooth forceps the vomiting instantly ceased. There was no recurrence and the child made a prompt recovery.

While the dentitional reflexes are ordinarily spastic in expression, as in the acute vomiting of the case cited, their range is a wide one including derangements of speech, hearing and of vision as seen in the many cases of strabismus among children of school age as well as chorea, epilepsy, dementia præcox—intellectual dulness leading to retardation in education and in mental deficiency.

When we consider the motor, sensory, sympathetic and special sense connec-



tions of the trigeminus, the wide scope and variety of the reflexes which may and do arise from continued physical irritation of its dental peripheral terminals are easily understandable. It is observable that in the early phase of these slight continued irritations of the dental nerve terminals the reflexes are intermittent and functional, but after a time they become chronic and continuous.

#### DENTAL STRESS OF THE SCHOOL PERIOD.

These graver manifestations are most prone to occur during the period of exchange of the deciduous for the permanent denture, the period of greatest dental anatomic and physiologic activity and consequently of dentitional stress. It is important to note in this connection that this period of most pronounced dental evolutionary stress covers the major portion of school life in which the brain is undergoing a more or less intensive educational training and when any interference with its normal functioning by reason of reflex dental irritation is capable of producing disastrous results, either as nervous breakdown, the development of any of the spastic or special sense disorders already enumerated or a mental impairment that will ultimately place the child in the class of retarded pupils of a segregation school.

Any mechanical interference with the normal eruption and alignment of the teeth of the permanent denture will induce pressure upon and irritation of nerve endings which either alone or associated with other sources of stress upon the organism may develop any of the reflexes here under consideration.

I have elsewhere drawn attention to malocclusion as a factor in the development of dental reflexes.\* So strongly am I impressed with the importance of the nervous element in connection with cases of malocclusion in children of school age and the irreparable damage it may cause that the usual factors of pleasing appearance or masticatory effi-

ciency I have come to regard as minor considerations. In all cases where dentition is proceeding and where abnormal nervous phenomena of whatever character are manifested, recourse should be had to the X-ray to determine or eliminate the possible existence of a dental impaction or the retarded eruption of one or more teeth. In this connection I would direct attention to the early evidences of malposition and developing impaction of the lower third molars, which in a number of cases have shown unmistakable evidence of developing impaction in patients fourteen years of age, and their surgical removal has eliminated the choreic attacks affecting the facial and neck muscles from which the patient was suffering.

Dental literature is replete with the reports of cases where the removal of impacted teeth has unexpectedly brought prompt relief from a variety of serious disorders covering a wide range of clinical manifestations. Time will not permit more than this general reference to them but for the most part the cures in these cases are regarded as unexplained phenomena or coincidental. The late Henry S. Upson in various communications and more particularly in his book "Insomnia and Nerve Strain," approached more closely to a scientific study of the etiology and pathology of these intensely interesting cases. Under a benefaction provided by his widow a complete collation of the literature of the subject has been undertaken and new cases are being studied by a group of experts with the facilities of the Evans Dental Institute at their disposal.

#### DEMENTIA PRÆCOX AND DENTITION.

Let me relate two cases of unusual interest:

A young man just graduated from an engineering school entered the service of a large electrical engineering corporation and in the midst of an arduous summer's work following a period of intense study for his degree suddenly became demented. Three competent specialists examined him and concurred in a diagnosis of dementia præcox with the result

\* DENTAL COSMOS, June 1917, p. 585.

that he was committed to an asylum for the insane for care as an incurable. His father having learned of some of the results in choreic and epileptic cases following the removal of impacted teeth brought him to the Evans Institute for examination. Radiographs revealed six irregularly placed and impacted teeth as possible, indeed probable, sources of peripheral nerve irritation. In view of all the circumstances and the seriousness of the patient's nervous and mental breakdown it was decided to remove the teeth in question. The operation was done under ether by Dr. Cryer and at the end of a week the young man was so much improved that he was taken from the asylum to his home and his father tells me that in ten days he was practically normal. He shortly afterward entered the service of the U. S. Government and for fully two years has been satisfactorily filling an important position as director of an electrical engineering department.

The second case is somewhat analogous; that of a young man whom I accidentally noticed among the insane patients in the Philadelphia Municipal Hospital. My attention was attracted to him by his more cultivated and refined appearance which placed him in a higher social scale than the average insane pauper with whom he was associated. Upon inquiry I learned from the interne that his was a case diagnosed as dementia præcox, that he had graduated from one of our well-known engineering schools and had subsequently developed the disorder which ruined his prospects in life and made him a helpless and hopeless melancholic. In a half joking way I said to the interne, "He probably has impacted wisdom teeth," which led to some explanation of dental reflex neuroses and to test the matter radiographs were taken and all of the third molars were found to be malposed, those of the mandible being badly impacted. At my suggestion the four wisdom teeth were removed by Dr. Cryer and two months later upon inquiry I learned that the patient had left the hospital. I thus lost sight of the case for over two years when talking over the incident recently with Dr. Cryer we decided to make an effort to ascertain if possible the young man's present condition. As a first step Dr. Cryer called up on the telephone the alienist who at the time on the operation was in charge of the insane department of the hospital. The office replied that the doctor was not in but inquired if there was any message. Dr. Cryer then stated that he was endeavoring to locate a young man suffering from dementia præcox

for whom he had removed four wisdom teeth about two years ago. The reply came back, "Yes, I can tell you about him for I am the patient who is now talking to you." We have since learned that he is acting as private secretary to the alienist who had him in charge as a hospital patient who reports him as greatly improved and practically normal.

Dementia præcox is generally regarded as incurable. I have not decided in my own mind whether these two cases refute that conclusion or whether they merely represent an error in diagnosis by three or four noted alienists. Be that as it may, they at least demonstrate the fact that two cases committed to asylums as incurably insane are now restored to normally useful lives as the result of removing primary sources of dental peripheral nerve irritation.

I have made this lengthy and very general presentation in the effort to create a background for certain conclusions which I desire to put before you in closing: first, that our absorption in the interesting and fertile investigation of the field of bacterio-pathology has for the time being at least caused us to overlook the immense importance of the neuroses arising as reflexes from peripheral dental irritation. My endeavor has been to convince your minds that the field of dental neuropathology is as important and that the results obtainable from its rational diagnosis and treatment are as dramatic and gratifying as any that have developed in the field of oral sepsis.

Viewed from the humanitarian standpoint dentistry has by reason of its recognition of the direct causal relationship between the septic oral cavity and many organic and systemic diseases taken an important position among the specialties of the healing art in the public health service of humanity. But the possibilities for a larger usefulness for dentistry have only been partially realized. The field which I have endeavored to indicate in this paper is almost unlimited and one that is pregnant with possibilities. But a small fraction of children of school age pass through the period of dental stress without some morbid nerv-



ous manifestation that may be temporary or as in many other instances it may lead to the gravest results. In my belief this class of pathologic activities is responsible for a larger proportion of mental retardation and physical deficiency in school children than is now chargeable to septic conditions of the oral cavity.

#### THE FIELD FOR RESEARCH.

What is needed is a systematic scientific survey of the mouth condition of groups of retarded children in segregation schools with special reference to the discovery of malerupting, malposed or impacted teeth that are sources of peripheral dental irritation and the

elimination of these factors of nervous disturbance. This would necessarily involve complete radiographic records of each case and their intelligent interpretation. New Jersey has an enviable record for initiating and carrying to a successful issue a number of important professional activities. I know of no one thing that would so redound to the credit of a dental association as for it to organize and conduct such a survey as I have indicated. I hope that this society may see fit to take the initiative for no other work would go so far to place dentistry where it rightfully belongs, in the leading place among the specialties of the healing art.

211 S. 12TH ST.

## The Care of Children's Teeth.

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(Read before the Georgia State Dental Society, Atlanta, Ga., June 1920.)

**T**HE care of children's teeth, formerly considered an incidental part of dentistry, now, as the problems of the dental practitioner become more complex and baffling and as our thoughts are directed earnestly toward causes and possible remedies for tooth destruction and loss, is practically the only direction from which we obtain any positive comfort or hope for the future in overcoming our difficulties.

The movement for the care of children's teeth had its inception about ten years ago. In 1911 a completely equipped dental department was established at Girard College, Philadelphia, which is an orphans' school and home for over 1500 boys. Here these children were given every dental attention possible, including orthodontic treatment,

three dentists, comprising an orthodontist, two operators and an assistant, devoting their entire time to this work.

In the same year the idea of the Forsyth Dental Infirmary for Children germinated in the minds of the Forsyth brothers of Boston, and on December 1, 1914, this magnificent Infirmary was completed and the doors thrown open to the thousands of the poor children of Boston and its suburbs. This we consider marks not only the most important step forward in dentistry the world has ever witnessed, but also one of the most benevolent and beautiful expressions of philanthropy ever conceived in the hearts of a humanity-loving family.

From that time to the present the growth of this movement has progressed rapidly, with the exception of a tem-



porary inertia during the war, until now we see in every city and town of any size in almost all sections of the country some provision either already established or contemplated for the care of children's teeth. Even in the rural districts, at least of New England, the State Boards of health or Red Cross societies, coöperating with county farm bureaus, are bringing dental care to the children by means of paid operators, who, with portable dental outfits, visit the various schools, and at a charge of from one dollar to two dollars an hour bring dentistry within reach of every child in the State.

It is noteworthy to mention here that the State of Massachusetts has so recognized the dental needs of its young citizens that it has appointed, as a member of its State board of health, a dentist who is largely influential in promoting these rural dental clinics.

#### HOW CHILDREN ARE CARED FOR AT THE FORSYTH INFIRMARY.

It might be of interest to relate, briefly, how the Forsyth Infirmary functions in carrying on its daily work among the children.

An average of twenty-five paid operators are on duty five and one-half days weekly throughout the year. During the school term almost the entire supply of children is brought to the Infirmary by school nurses in groups of from five to twenty at a time. Nearly a hundred school nurses from Boston and vicinity bring groups of children from their various districts every week. Saturday mornings and during the summer vacation the children come as individuals. None of the little patients are kept in the chair longer than an hour at a time, the average being from thirty to forty minutes. Between 300 and 400 children are thus treated daily. This number is augmented greatly during about half the year by prophylactic cases taken care of by the dental hygienists of the Forsyth Training School.

During the first year of the Infirmary's existence the average age of the children treated was around twelve

years. Now the age average is about seven years. This reduction in age has been accomplished by most strenuous educational work among the parents by nurses, teachers, and operators in the Infirmary, but the results obtained in getting the little ones, at least before much tooth destruction in the sixth-year molars has occurred, have more than rewarded all those interested in this effort.

This lowering of the age at which the children come under the care of the Infirmary has also greatly reduced the number of visits each child must make before its work is completed. Formerly it was between five and six visits; now it is three. Thus, it is obvious that many more children are cared for than otherwise could be, and thousands more teeth are saved than if the efforts were directed to the children in the older grades in the schools.

The policy governing extractions, on first thought, may be considered drastic. But in such an institution, it is not so much a question of how *many* diseased teeth, deciduous or permanent, can be treated successfully, as it is of reaching as many children as possible before the pulps, through decay, are involved, and the only humanly possible way that this could be done and the ground be covered was to extract all diseased deciduous teeth and the major portion of putrescent or abscessed permanent molars, and so concentrate our efforts at conservation on vital teeth. This policy results in sending all completed cases away with clean healthy mouths, even though irregularities do develop later, many of which have begun long before.

In summing up the dental work of the Infirmary during its five and one-half years of service it is interesting to note that over 86,000 individual children have been registered and received treatment. The work for these children totals over 849,000 dental operations, not counting extractions, including 612,000 fillings and 94,000 prophylactic treatments. More than 68,000 dismissals, representing all work completed, have been issued during this period.

We have mentioned some of these de-

tails relating to the Forsyth Infirmary merely to give some idea of the magnitude of the dentistry being furnished to the children in one city.

#### THE DENTIST'S RESPONSIBILITY IN THE CARE OF CHILDREN'S TEETH.

Let us now turn to the question of responsibility in caring for children's teeth as it applies to those in private practice. Dental work, when deemed necessary at all in children's mouths, has been considered the least important of all the various duties the dentist is called upon to perform. That this condition has been and is still true to an enormous extent is not, primarily, so much the fault of the individual dentist as it has been and is the fault of the dental schools. "As the twig is bent so is the tree inclined," was never more genuinely true than when viewed in the light of the results obtained by most of the dental schools in their graduates, whose aims and ideals are to "build bridges" in ravaged mouths rather than to be an active force in preventing the necessity for such ingenious and unsatisfactory devices.

It was with surprise but with admiration that I learned of the course in children's dentistry, properly known as the Department of Dental Orthopedia, recently introduced in the Atlanta Dental College of this city. So far as I know yours is the first and only dental school which has so advanced its ideals as to the needs of the fully developed dental graduate of today, and you who have the destiny of this institution in your keeping are to be congratulated.

#### QUALIFICATIONS NECESSARY FOR HANDLING CHILDREN.

There are three most important qualifications a dentist must have to successfully do children's work: (1) He must have a natural liking for children. How easily the child recognizes this quality, the outgrowth of which is kindness, and kindness to children in the course of

supplying their dental needs brings its reward indeed. Firmness is frequently necessary, but kindness and firmness are by no means incompatible. (2) He must be endowed with an infinite supply of patience; not patience belonging to the easy-going self-satisfied nature, as he accomplishes little of any real worth, but rather a patience born of understanding the viewpoint of the child as it stands in innocent expectation of an entirely new and unfortunately often dreaded experience. (3) An unwavering, uncompromising honesty, both in conversation with the child and in the work performed. It seems to be a revelation to some children to realize that their dentist is telling them the truth, and how easily their confidence is obtained and held when once they know they can trust you.

Honest dentistry in the mouths of children by the average private practitioner is something that is rarely performed, if we are to judge by what we see in our daily clinical observations. This merely bears out what we stated previously, that working for children is considered the incidental part of the day's work. The average dentist is satisfied to get them in and out of the chair as quickly as possible without disturbing too much his waiting clientele of adults. What he does, and how well, is of minor importance. To me this fact is one of the saddest revelations I have been forced to make to fond and painstaking parents, who would do anything within their power to have their children's teeth and dental arches properly cared for at the right time, but who awaken to the knowledge that their child's sixth-year molars, filled by their private dentist, must be extracted or carried through life as pulpless teeth, the deciduous teeth broken down and diseased and arches contracted, simply because their dentist was either ignorant of consequences or dishonest enough to fill unsterilized cavities over masses of decay. That these things should be so is an everlasting disgrace and stain on the dental profession. I am saying this with the full knowledge of the difficulties



often encountered in doing work for certain children, and clearly realizing that ideal results cannot always be obtained.

THE AGE AT WHICH THE CHILD SHOULD COME UNDER THE CARE OF THE DENTIST.

At what age should the work for children be undertaken? We are not attempting in this paper a discussion of the care of children's teeth previous to the time they can be brought to the dentist for periodical supervision. This, we think, should not be earlier than three years. Prior to this time advice must be given to parents as to feeding, cleansing the teeth, etc., by means of lectures or printed instructions, or as advice is sought in individual cases. But at the age of three years a normal child is able to converse, and being at the most impressionable period, the little ideas they grasp from your conversation remain, and grow to be a part of their simple creed. They can be taught the art of manipulating their toothbrushes alone, even though raincoats are necessary to keep them dry. Five minutes' time at this age devoted to teaching a child this duty is worth an hour's time and worry later, as each new accomplishment becomes of less importance and hence more easily forgotten. No child should be indulged by parent or dentist to the extent of being permitted to go monthly to have his teeth cleaned by the dentist or hygienist, simply because he is too careless to do it himself, or his parents too preoccupied to follow this up with him. Twice or three times yearly is frequent enough for children to be seen by their dentist. The exception is where extreme caries has already prevailed. In such cases soft fillings at first should usually predominate, and ought to be inspected monthly for a time, and replacements with a more substantial material made where originally the pulp would not accept it.

Dental work in deciduous teeth may be discussed under the captions of *vital* and *pulpless* teeth, and in presenting this please bear in mind that we are referring always to deciduous teeth unless otherwise specified.

THE CARE OF VITAL DECIDUOUS TEETH.

Under the heading of vital teeth we will first consider large cavities close to the pulp, but no exposure. These, in anterior teeth, are filled with a mixture of zinc oxid and eugenol. The molars we fill with this combination, to which is added a drop of silver solution or a little powdered silver nitrate. The zinc oxid and eugenol must first be mixed to the consistence of putty, after which the silver solution is thoroughly incorporated. This makes the best filling material we have yet discovered for posterior deciduous or even permanent teeth in this class of cavities. The silver solution in no way irritates the pulp through this approximate contact, and the additional sterilizing property, also hardness of the filling when set, makes it the true "missing link" between a permanent cement or amalgam and a soft zinc oxid and eugenol filling, where each of these are indicated. Its durability, when properly mixed and inserted, is attested from the fact that frequently we have large fillings, even in sixth-year molars, which return after a year, showing no wear at all, but apparently as hard as amalgam.

All cavities revealing exposures are filled with plain zinc oxid and eugenol. Where the exposures are large the mixture should be made thinner, to avoid too much pressure on the pulp; otherwise it may be used with perfect comfort directly over the exposure. At best, this is a soft filling material, and molar teeth, especially, must often be refilled later with something more durable, leaving part of the zinc oxid and eugenol over the pulp as a protection. These two filling materials, which vary only because of the added silver solution, are the most universal, since the majority of cavities produce near or actual exposures.

Medium or small cavities are filled largely with cement, copper in posterior and oxyphosphate in anterior teeth. Copper cement is not chosen because of its supposed antiseptic property, as our research laboratory tests show most of them as producing little if any such results, but rather because it is quick-set-



ting, partially hydraulic, and durable. These first two properties are pertinent in doing children's work, on account of the free flow of saliva which must be combated.

Labial and buccal cavities which extend underneath the gum margin are best filled with white base-plate gutta-percha, this material far outlasting cements in these locations.

Copper amalgam is valuable as a substitute where other filling material fails, such as in mouths where cements disintegrate rapidly, also in large shallow cavities in defective teeth.

The third and last class of cavities to be touched upon, including defects in vital teeth, are minute approximal cavities, deep pits or fissures with no decay, malformations, and faulty developments. None of these conditions require fillings, but are thoroughly treated with Dr. Howe's silver solution and formalin, after first grinding off and smoothing any sharp cavity margins or projections. The reduced silver salt is left deposited in all these sterilized crevices and decay is prevented.

#### THE CARE OF PULPLESS DECIDUOUS TEETH.

The treatment of pulpless teeth should not be attempted where root absorption has progressed far. When this stage is reached it is self-evident that extraction is the next step, and no injury to the arch development can result. Where little or no root absorption has occurred, treatment in most cases can be successfully undertaken. The rubber dam must be used in all this work, and the willingness of the little patient to agree to this arrangement is the first requisite for success.

Let us consider, briefly, the following conditions of pulpless teeth, classified as partially vital, no vitality or putrescent, and abscessed.

A partially vital tooth is sterilized, using four per cent. formalin and hot air, and the contents of cavity, pulp chamber, and root canals removed as far as the putrescence extends. The remaining vital tissue can usually be anesthe-

tized by agitating it with a smooth four-sided broach, bound with cotton, and dipped in cocain dissolved in phenol. After the removal of the broach, the canals are filled with a paste of zinc oxid, eugenol and aristol, followed by filling the cavity.

Pulpless, putrescent teeth are treated to completion the same way as partially vital teeth are started, namely, with four per cent. formalin evaporated with hot air. By this means the entire contents of the cavity, pulp chamber and canals are sterilized in advance of removal, the formaldehyd gas uniting with the generated gases from the infected pulp contents, rendering them as well as the pulp residue innocuous.

Dr. Howe's method of root-canal sterilization can also be used successfully in temporary as well as in permanent root-canal work.

Abscessed teeth, where soreness is present, should be carefully opened and left open until the soreness disappears through drainage, then treated as a putrescent tooth. Where a fistula has opened it should be irrigated with Dakin's solution, or physiologic salt solution, from the tooth out through the tract, then the root canals and cavity filled as described.

Some failures must be looked for in these treatments, but if judgment is used in the selection of those which ought to be retained and conscientious effort is put forth in the treatments the results are well worth the time devoted.

#### CARE OF THE SIXTH-YEAR MOLAR.

We have not touched on any operations affecting the sixth-year molar. A separate paper could be written on this subject alone. There are, however, two lessons we think we have learned in connection with sixth-year molar dentistry. The first is, to cap all exposed pulps which are keenly sensitive and possessing no history of pain at night. All decay being first removed from the cavity, a crystal of thymol is placed directly over the exposure and melted with a warm burnisher. This protects the pulp from any pressure of the zinc oxid and eugenol

filling, which is inserted and left there for a time as a trial. Seldom does this fail, and the tooth is saved, but a sixth-year molar devitalized at an early age surely cannot be considered as saved. No risk is run if the patient or parent is informed as to just what you hope to accomplish, and should you fail you are no worse off than at the start, if on the first signs of failure the patient returns as instructed.

The second lesson is that diseased or pulpless sixth-year molars, if in the majority, are best extracted at about the age of ten years, or just after the bicuspid are all fully erupted, these holding the bite, and before the eruption of the second molars. Also, that if three sixth-year molars, being diseased, are marked for extraction, the fourth, though sound, should be extracted also. We have taken numerous models of these cases, and find that at this age the second molars erupt in the positions of the sixth-year molars, with slight tilting, and the bicuspids, being erupted at the time of extraction, have not drifted back and apart. Noticeable alterations of facial contour are slight in after years, except to the trained eye. Surely this procedure is better than attempting to carry through life from early age pulpless teeth, no matter how skillfully treated. To be sure this is not obtaining a perfect or ideal result, but, as we once heard a noted surgeon say, "I am not responsible for the condition my knife reveals." So when a child comes to us with broken down sixth-year molars we are scarcely responsible that we cannot bring about ideal results for that particular patient. We *are* responsible, however, for every careless or improper piece of work we do, or advice we give our patients after they are once placed in our care.

#### PREVENTIVE DENTISTRY.

The subject of preventive dentistry is fast assuming a position of great importance in all discussions of the present day relating to dental science. Attempt to divorce the preventive dentistry idea from the only field where it can be practiced at all, namely, that of caring for the mouths of the children, and what

have you? Practically nothing. The term becomes obsolete. Preventive dentistry, to mean anything comprehensive, must mean not only the prevention of caries, but also the prevention of deformities of the dental arches and the habits which go to promote such irregularities in facial development, and the education of both parent and child in the things which lead to the wholesome, well-rounded growth of the child, in so far as this relates to the dental economy.

How is this great work to be accomplished? Not, we believe, by flooding the country with dental hygienists and leaving it all in their hands, as some members of our profession would have us believe is the right and only way. The dental hygienist has her place, and under proper supervision can do an immense amount of good. She is a cog in the wheel. But to turn over to her the whole question of the education of the public, young and old, in mouth hygiene, in all its ramifying problems affecting dental education, and to attempt to fit her for this responsibility in one year of training, is undoubtedly an impossibility and a mistaken idea.

This problem belongs to the dentist. It should be his inheritance from his alma mater. Unfortunately this has not been so. The dental schools must all alter their curricula. The care of children's teeth must be made the leading and most talked about course in the entire four years' training of the dentist. This is the day of specialists, and there must be child specialists in dentistry as there are in medicine. The need is even greater in our profession. Only men who love children, who are conscientious in all things pertaining to the dental requirements of their young patients, should attempt to qualify. The dental graduate should go forth with every pore oozing with enthusiasm over this work, and with confidence in himself, born of realizing the tremendous importance of his calling; he will then make his presence felt, no matter where he chooses to start his practice. Then only will preventive dentistry become a reality in its select and only possible field of operation, the care of children's teeth.



# Mechanics in Orthodontia, from a Modern Aspect.

By MILO HELLMAN, D.D.S., New York, N. Y.

(Read at the annual meeting of the Dental Society of the State of New York, Albany, May 13, 14, and 15, 1920.)

A GREAT lawyer, statesman and philosopher of a former age, Francis Bacon, said that truth came out of error much more rapidly than it came out of confusion. There is a wonderful truth in this saying. The famous scientist, Thomas H. Huxley, adds that "next to being right in this world, the best of all things is to be clearly and definitely wrong, because," says he, "you will come out somewhere. If you go buzzing about between right and wrong, vibrating and fluctuating, you come out nowhere; but if you are absolutely and thoroughly and persistently wrong, you must some of these days have the extreme good fortune of knocking your head against a fact, and that sets you all straight again."

Similarly, the restlessness agitating this beautiful world of ours, can be satisfactorily interpreted on this basis. The people as a whole are not just wrong; they are confused. And this is what makes the present conditions at times desperate. Let it be hoped that error may succeed this chaos and that the great, big fact of the brotherhood of mankind will "bump" the people's heads strongly enough to restore the world soon to its senses.

In orthodontia, no less than in manifestations in general, there are circumstances that bring about similar situations. The development of orthodontia has progressed despite many handicapping influences. But, in the course of development, it has not entirely gotten rid of encumbrances that betray a tendency of confounding not only its scope, but also its fundamental requirements and its beneficial possibilities. For in-

stance, the conception of mechanics as concerned in orthodontia has brought about more confusion than is generally realized. This is mainly due to the popular belief that mechanical ability is a qualification *sine qua non* for orthodontic success. Owing to this assumption, and its inseparability from other undue influences brought about through various sources, a line of cleavage is created in the minds of most of us, rending asunder the part of orthodontia associated with the practical or the clinical side from that related to the theoretical or the scientific. As a result, the adherents of these two views seem to be at loggerheads. It must, however, sooner or later be realized that there is no definite line of distinction between these two phases.

There is some science in the mechanics and some mechanics in the science of orthodontia. It is the indiscriminate use of the term "mechanics" in its relation to orthodontia that confuses most of us. Thus, malocclusion of the teeth is assumed to be due to various mechanical causes of pressure; mechanical principles are employed to construct an orthodontic appliance; the appliance is used as a mechanical means to move the malposed teeth into the line of occlusion; it is assumed that the mechanical apparatus causes the teeth to move in accordance with physical law; and when in normal occlusion the teeth are assumed to present a mechanically perfect apparatus. We are, therefore, so impressed with the idea of mechanics in its various manifestations that we lose sight of all other phenomena involved. In order to disillusion ourselves, it is



necessary to approach this topic in an unprejudiced manner and from an unbiased and impartial attitude. It will, therefore, be apparent that if the following questions be fairly and squarely answered, we shall have taken a long step in the direction of the truth.

1. Do teeth under natural conditions move in accordance with mechanical principles? That is, do they follow physical laws in movements from normal to abnormal positions, if through accident, extraction or disease their normal retentive environment is disturbed?

2. Do the malposed teeth, when artificially brought into their normal position, move in accordance with Newton's third law of relation between action and reaction? That is, does the orthodontic appliance and the teeth upon which it is adjusted constitute a mechanism that may be interpreted as being illustrative of Newton's law, that action and reaction are equal but in opposite directions?

3. Are the known mechanical principles involved in the construction of an orthodontic appliance so intricate that the average intelligence of orthodontists or dentists is insufficient for their comprehension? That is, *must* we seek the advice of engineers and mathematicians in order to be able to construct an appliance for the correction of a case of malocclusion?

4. Are the mechanical principles of an appliance to be blamed for the failure or credited with the success of a case? That is, does the skill of the operator in the treatment of a case of malocclusion entirely depend upon the virtues and vices of the appliances, or are the appliances merely his means to obtain an end, and subject to his talents and abilities?

By this general division, it will at once be apparent that "mechanics" in orthodontia is used rather loosely. By confining this term to its proper sphere, a better idea may be obtained relative to other processes at work. It is, therefore, hoped that by a satisfactory explanation of these differences, the conception of *orthodontia* and *mechanics* may be clearly defined.

#### LAWS GOVERNING THE MOVEMENT OF TEETH.

1. *Do teeth under natural conditions move in accordance with mechanical principles? That is, do they follow physical laws in movements from normal to abnormal positions, if through accident, extraction or disease their normal retentive environment\* is disturbed?*

According to Godon, the normal human dentition represents a force in equilibrium. This equilibrium is maintained by the mutual mechanical support of each tooth by its adjacent and antagonizing members. With the loss of one factor involved in the maintenance of this equilibrium, a corresponding disturbance will ensue in the others. As illustrated in Fig. 1, Godon represents a balancing of forces as it is manifested by the occlusion of the teeth explained on the basis of physical laws. It will be seen that, according to the parallelogram of forces worked out by him, the dentition in normal occlusion is represented to be in equilibrium. Moreover, if this equilibrium is disturbed, a modification thereof will ensue; and this will be in exact proportion to the influence of the disturbing factor. Thus, if the antagonizing force of the upper premolar and molar is lost, as shown in Fig. 2, the balance of force is disturbed. The lower tooth then simply rises in its socket, as is indicated by the dotted line. If, on the other hand, an adjacent tooth is lost, as is shown in Fig. 3, or Fig. 4, the displacement will be in accordance with the loss of physical resistance, and the remaining adjacent teeth will migrate in accordance with the directions indicated by the parallelogram of force. Thus, the intersection of the lines  $B'$ ,  $B''$ ,  $C'$ ,  $D'$ , create a center of rotation at their crossing point. As the forces creating this point are disturbed, the

\* Retentive environment is used here in the sense of indicating that environment of a tooth, which under normal conditions holds the tooth in its allotted position. It, therefore, includes all supporting structures, as well as the circulating systems and nerve supply.

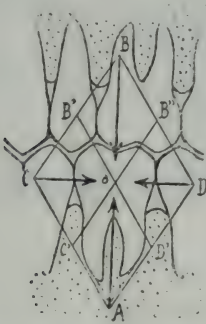
tooth will incline in the direction pointed out by the arrows.

Diagrammatically, this is very well illustrated, and theoretically, it is per-

the upper jaw, the teeth remaining distally will move mesially, as in Fig. 5 A, and B; but when the first deciduous molar is extracted, the second deciduous

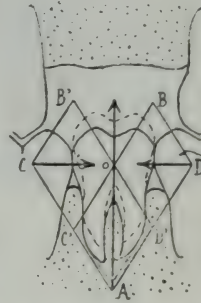
SCHEMATIC REPRESENTATION OF THE NORMAL DENTITION IN EQUILIBRIUM. (After Godon.)

FIG. 1.



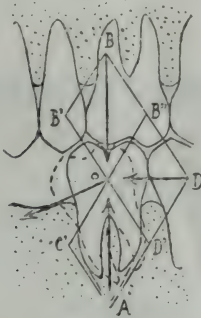
Showing assumed horizontal and vertical forces as indicated by arrows originating during mastication, and contributing toward the establishment of equilibrium.

FIG. 2.



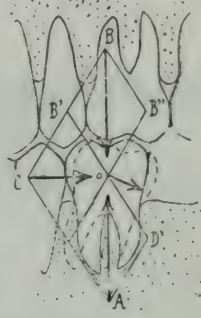
Showing loss of resistive force above, due to extraction of upper molar and consequent extrusion of lower molar.

FIG. 3.



Showing loss of adjacent tooth mesially, with consequent inclination of the molar in that direction.

FIG. 4.



Showing loss of adjacent tooth distally, with consequent inclination of molar distally.

haps quite correct. But if an investigation of natural manifestations of such character be undertaken, it will be found that those expectations are not realized. For instance, there are certain tendencies associated with migrating teeth that do not quite coincide with these rules. It has been found by J. G. Turner, and this can be verified by everyone, that following the extraction of the second premolar or of the second deciduous molar in

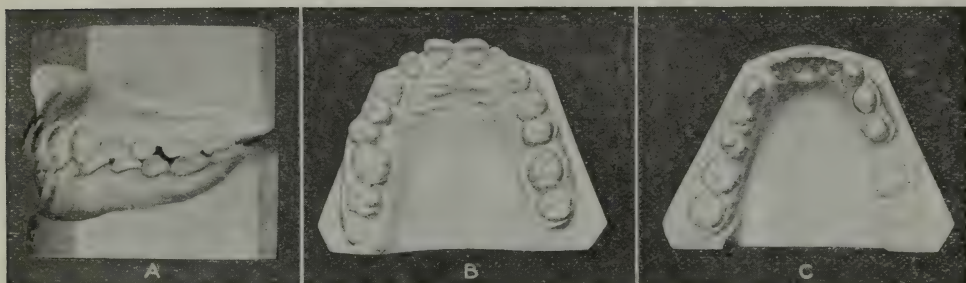
molar will *not* move forward, as in Fig. 6.

On the other hand, following the extraction of the second deciduous molar or of the second premolar in the lower jaw, the movement of the teeth behind is not bodily forward as in the upper jaw. They *tip* forward. Also, when the first deciduous molar is extracted, the deciduous canine moves backward. And subsequent to the removal of the lower first



permanent molar, the second molar will tip considerably forward and inward, premolar frequently assuming its position in the immediate proximity of the

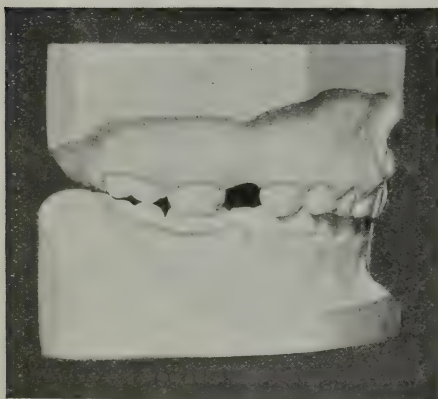
FIG. 5.



Casts of dentition with some missing teeth. A. Left side of dentition in occlusion, showing loss of upper first molar and migration of upper second and third molars mesially, also migration of the lower premolars and canine distally; while the lower second and third molars are only inclined mesially and lingually. B. Occlusal aspect of upper dental arch, showing the same manifestation as under A, but from another aspect. C. Occlusal aspect of lower dental arch, showing the same manifestation as under A, but from another aspect.

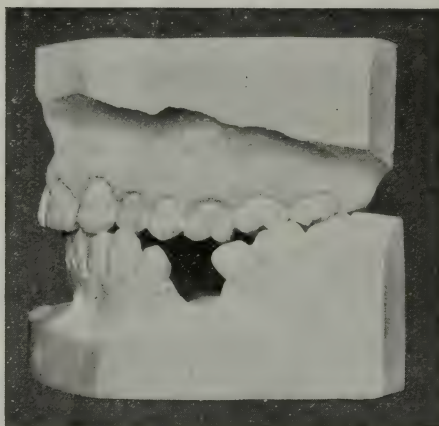
but the anterior teeth will move backward (Fig. 5 A and c). This tendency second molar when the first molar is lost, leaving at times the full molar space

FIG. 6.



Casts of dentition, showing loss of upper right first deciduous molar, and no mesial migration of second deciduous molar. The slight mal-relationship of the molars is due to the tendency toward Class II (*Angle*) malocclusion.

FIG. 7.



Casts of dentition, showing tendency of second lower premolar to take its position in the immediate proximity of the second molar when the first molar is lost.

of the anterior teeth to move distally in the lower jaw is illustrated by the second

between the two premolars. (See Fig. 7.) Thus, it appears that there are inherent tendencies governing migration



of teeth; diverse teeth following different paths. In the upper jaw, there is a forward bodily movement of the molars and in the lower, a backward movement of the premolars, especially the second. The lower molars, on the other hand, only tip forward. Moreover, this movement affects the teeth which are already erupted, as well as those which are to erupt.

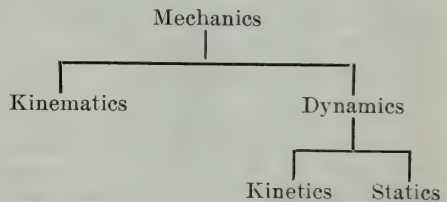
Explanations of the causes of these tendencies are numerous, but unsatisfactory. Thus, pressure is advanced as a prominent factor. For instance, in the forward tipping of the lower molars, Turner holds cheek pressure responsible. That this is erroneous is self-evident. Because, if it were so, why do the molars also incline lingually despite the resistance offered by the pressure of the tongue? Furthermore, if the cheek accomplishes the forward tipping of the lower molar teeth, why does the same force fail to hold the second premolar in place instead of permitting it to move backward (distally) when the first molar is lost? Moreover, why does the cheek pressure influence the tooth movement in the lower jaw in one way and in the upper in another? The upper molar teeth do not tip forward. If they move, they do so bodily. And how does it happen that the teeth migrate before their eruption, *i.e.*, before they are subject to the cheek pressure? It will readily be appreciated that these questions cannot be satisfactorily explained upon a mechanical basis alone. There must be also a vital factor. Explanations of surface tension of cellular elements, circulatory influences, elasticity of certain connective-tissue fibers, tonicity of muscle cells and fibers, etc., if taken into consideration, may be of some help in the solution of this problem. But as such explanations would lead us beyond the scope of this paper, it must be dismissed for the present with the hope of returning to it at some future occasion. Suffice it for the present to take cognizance of the observation of facts, leaving alone the question of cause. It must, however, be reiterated that the facts bearing on this question do not cor-

roborate the mechanistic contention that migrating teeth perform their movement in conformity with physical laws.

#### PHYSICS VS. TOOTH MOVEMENTS.

2. *Do the malposed teeth, when artificially brought into their normal position, move in accordance with Newton's third law of relation between action and reaction? That is, does the orthodontic appliance and the teeth upon which it is adjusted constitute a mechanism that may be interpreted as being illustrative of Newton's law that action and reaction are equal but in opposite directions?*

In the estimation of the great majority of orthodontic authorities, this question would be answered in the affirmative. Thus, Angle states that "the movement of one or more teeth in any of their several directions is possible only by the exercise of force and its intelligent application in accordance with the laws of mechanics and dynamics." G. D. Fish, a civil engineer, explains the basic laws of mechanics applicable to appliances for moving teeth as follows:



*Mechanics* is the branch of physics that treats of the phenomena caused by the action of forces on material bodies. *Kinematics* treats of motion without reference to the forces and other circumstance of motion. *Dynamics* is the mathematical treatment of force and the other circumstance of motion; *Kinetics* is that branch of dynamics which deals with variable motion, while *Statics* with uniform motion and rest.

Though it is true that in physics energy controls matter and form, yet in physiology function controls the organ, and in animal mechanics motion controls and in a sense creates the form of muscles and bones.

The contention of Professor Osborn

must be agreed with, that "Newton's third law\* of the equality of *action* and *reaction* is the foundation of the modern doctrine of energy, not only in the Newtonian sense but in the most general sense." But we must remember that, according to the same authority, "*Actions* and *reactions* refer chiefly to what is going on between the parts of the organism in chemical or physical contact, and that they are subject to the two dynamical principles of transformation of mechanical energy (motion) into heat or heat into mechanical energy (motion)." Like the properties of light, the Newton laws of action and reaction have recently been modified. Although for about 230 years it has been believed that the rays of light are traveling in straight lines, it was only recently that Einstein modified this view. According to Einstein, light rays travel in curved lines. Thereby to the properties of light, of *polarization*, *reflection* and *refraction*, Einstein added also the property of *deflection*. Similarly, Professor Pupin of Columbia University, an eminent physicist, introduced the idea of *interaction* to fill the gap between *action* and *reaction* when applied to vital processes.

Osborn contends:

*Interactions* refer to what is going on between material parts which are connected with each other by other parts, and cannot be analyzed at all by the two great dynamical principles alone (i.e., by actions and reactions) without a knowledge of the structure which connects the interacting parts. For example, in interaction between distant bodies, the cause may be very feeble, yet the potential or stored energy which may be liberated at a distant point may be tremendous. Action and reaction are chiefly simultaneous, whereas interaction connects actions and reactions which are not simultaneous; to use a simple illustration: when one pulls at the reins the horse feels it a little later than the moment at which the reins are pulled—there is interaction between the hand and the horse's mouth,

the reins being the interacting part. An interacting nerve impulse starting from a microscopic cell in the brain may give rise to powerful muscular action and reaction at some distant point. An interacting enzyme, hormone or other chemical messenger circulating in the blood may profoundly modify the growth of a great organism.

#### RESPONSE OF TEETH TO MECHANICAL FORCE.

Likewise in orthodontic treatment. It cannot be said, as many contend, that the mechanical principles employed are based upon Newton's third law. First, because the action and reaction are not simultaneous; and secondly, because there are intervening parts connecting those acting and those reacting. Thus, when an appliance is utilized for orthodontic purposes, the result consists in a modification of the alveolar process. This modification in turn consists of an increase or diminution in magnitude of the tissues constituting the alveolar process for the favorable accommodation of the teeth. In proportion as the alveolar process changes in magnitude, the teeth will change in position. As observed, there is a considerable lapse of time between the application of the force and the response of the teeth. During this lapse of time, there is an interaction going on within the circulatory and nervous systems, the periodontal membrane and the osseous tissue surrounding the teeth. These tooth-supporting tissues *interact* in a manner to prepare the way for a change in position of the tooth. Moreover, while the acting and reacting parts respond apparently in accordance with mechanical principles, the interacting media respect more the biological laws. Thus, comparatively insignificant amounts of force exerted by the delicate appliances produce enormous changes in growth of the alveolar process.

#### PHYSICAL RESPONSE TO FORCE.

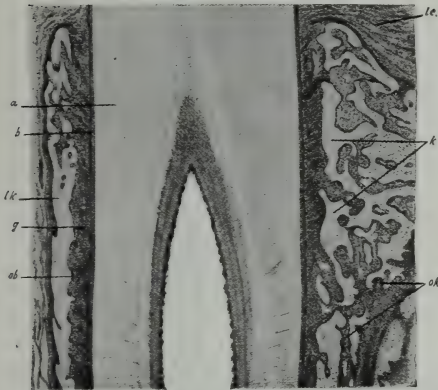
The character of motion produced in response to the mechanical force exerted upon the teeth differs considerably from that seen in purely physical phenomena.

\* "To every action there is always opposed an equal reaction; or the mutual actions of two bodies upon each other are always equal, and directed to contrary parts."



Experiments were performed upon several devices designed to imitate artificially the teeth in their sockets and the peridental membrane. The application of force by means of orthodontic appliances shows distinctly that by causing the crown of a tooth in this physical denture to move in one direction, the root apex will move in an opposite direction, *i.e.*, there will be a retrograde movement in the region of the root. For instance, by applying force upon the

FIG. 8.



Section through a normal tooth of the Dog-faced Monkey (*Cynocephalus*). On the left occlusal side; *a*, dentin; *b*, cementum; *g*, peridental membrane; *lk*, compact bone of lamellated structure; *ob*, osteoblasts; *lc*, dental ligaments; *k*, spongy bone on the lingual side; *ok*, osteoclasts. (After Oppenheim.)

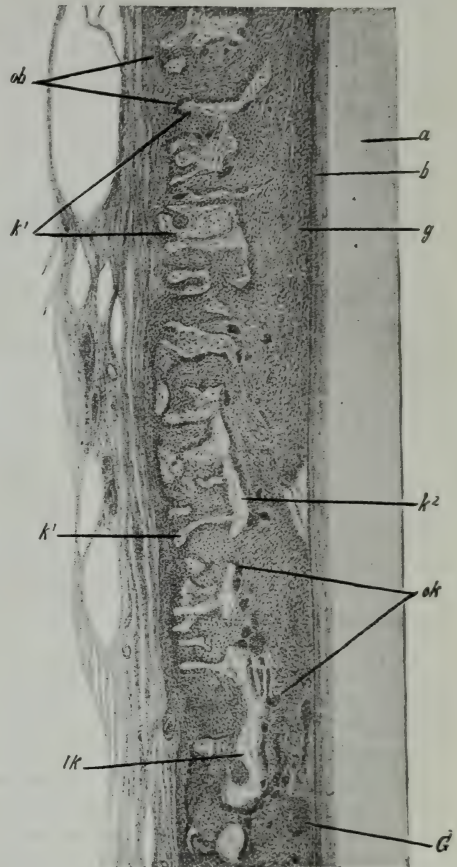
crown to push it lingually, the root end will move labially and *vice versa*, if that tooth is subject to physical laws alone. On the other hand, biologic phenomena reveal different manifestations. Thus, when like pressure is exerted upon a tooth in the mouth so as to move it as stated above, the entire tooth moves in that direction from the occlusal surface of the crown to the root end in the alveolus.

#### VITAL RESPONSE TO FORCE.

To elucidate, let us examine just three sections from the experimental evidence

furnished by Oppenheim. In Fig. 8, a section of a normal tooth of the Dog-faced Monkey (*Cynocephalus*), the gen-

FIG. 9.



Labial movement; labial side; at *ob* near the alveolar border; the compact bone has disappeared and is replaced by spongy bone, with orientation of the spicules vertically to the long axis of the tooth. Between *G* and *ok* transitional zone. *a*, dentin; *b*, cementum; *g*, peridental membrane; *G*, bloodvessels; *lk*, compact bone of lamellated structure; *ob*, osteoblasts; *k^1*, newly formed bony spicules beset with osteoclasts (*ok*); *k^2*, remains of compact bone that has lost the lamellated structure. (After Oppenheim.)

eral arrangement of the bone spicules of the alveolar process may be observed. The characteristic manner in which they

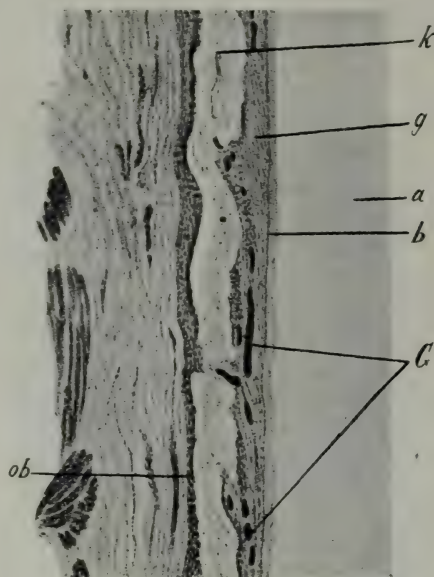


are orientated on both sides, labial and lingual of the tooth, is plainly visible. In a general way, however, it may be said that the spicules of the labial alveolar wall, for instance, are arranged *parallel to the long axis of the tooth*. Let us now examine the labial alveolar wall of a section of a tooth that has been experimentally moved by orthodontic means, Fig. 9. It will be seen, first, that there is a remarkable modification and general rearrangement of the bony spicules on this side of the tooth, and, secondly, that this change is of considerable conspicuousness at the alveolar border and then it decreases in intensity as the apex of the root is approached. In fact, the apical region is hardly disturbed. It shows thereby, that on exerting gentle pressure at a point on the crown so as to move the tooth in one direction, there is *no retrograde movement created in the root region contrary to its occurrence in purely physical manifestations*. The tooth root moves in the same direction from the point of pressure to the root apex. The movement is more intense at or near the point of pressure and decreases in intensity as the root end is approached.

Another form of evidence of the biological phenomena may be gained by the examination of Fig. 10. This illustration shows a remarkable contrast concerning the effect of force upon vital tissues when somewhat intensified. Although the kind of physical means was of a like nature, the result obtained is different. Under physical conditions alone, excessive force would produce extensive tooth movement, but upon vital tissues excessive force reacts in a reverse manner. Thus, by the application of intense pressure, as was done in this instance, the bloodvessels are mechanically compressed and the circulation interfered with. As seen in this illustration, the bloodvessels are thrombosed, and there is a marked difference in the appearance of the bony tissue as a whole. Instead of reconstruction of the bony elements, there is an intensification of the ossific process, no modification in the arrange-

ment of the spicules and no reaction in the form of movement of the tooth at all. It shows, moreover, that, although we have an appliance in action, there is some interaction, unfavorable in this instance, and no reaction whatever, due to an exaggeration of mechanical force. It is, therefore, evident that the vital pro-

FIG. 10.



Labial movement; labial side; application of intense force. The compact bony plate (*k*) throughout somewhat attenuated; no architectural reconstruction; all vessels (*C*) of the peridental membrane filled up with homogeneous masses (thrombosis); *a*, dentin; *b*, cementum; *g*, peridental membrane; *ob*, osteoblasts in sporadic layers. (After Oppenheim.)

cesses concerned in orthodontic procedure are the most important phenomena the operator has to contend with, and that the tissue changes incident to the movement of a tooth are entirely subservient to biologic limitation. We must, therefore, discipline ourselves to think in terms of biology when tooth movements are involved, despite the means employed to bring them about.

## BIOMECHANICS.

To reconcile this two-fold aspect, it is deemed of considerable advantage to introduce a term that will readily suggest the exact scope of the problem we are confronted with. As life processes are manifested in the response to physical stimulation, the indication of both must be made evident in our terminology. "Biomechanics" will more nearly explain the procedure involved than the term hitherto employed. Fusing as this expression does, the mechanics applied in the delivery of force and the biological manifestation obtained as a result, it at once suggests the movement of the teeth as being associated with *vital and mechanical processes*. The idea thus conveyed will at once put an end to the misconception relative to a purely mechanical procedure, as it implies also the tissue changes taking place during orthodontic treatment.

## PRINCIPLES INVOLVED IN THE CONSTRUCTION OF APPLIANCES.

3. *Are the known mechanical principles involved in the construction of an orthodontic appliance so intricate that the average intelligence of orthodontists or dentists is insufficient for their comprehension? That is, must we seek the advice of engineers and mathematicians in order to be able to construct an appliance for the correction of a case of malocclusion?*

The evolution of orthodontia is closely associated with an immense accumulation in number and form of appliances. This is, however, not surprising, because until recent years the forms of malocclusal conditions were also regarded as a conglomerate mass of individual manifestations bearing no relation to each other. With the adoption of a classification for the sorting out of the various positions assumed by the teeth, dental arches and jaws in their deviations from the normal, an influence was also brought to bear on the mechanisms employed in treatment. Thus, as long as each case of malocclusion was considered an indi-

vidual manifestation, it was necessary to *invent* for each one a separate appliance. The practitioner was then confronted with a situation that compelled him not only to be a mechanic, but also an inventor. Moreover, since each appliance was really a new invention, its use also constituted an experiment. And so all orthodontic treatment was one continuous series of inventions and experiments—experiments in the treatment of cases and experiments in the testing of appliances.

With the introduction of the classification of malocclusion of the teeth by Dr. Edward H. Angle, a system of law and order was instituted that changed the conception of the entire problem. For, by the recognition of the fact that the teeth, the dental arches and the jaws in their irregularities also assume definite relations to each other, general systems of orthodontic procedure were not beyond hope. And so the inventive genius immediately simplified the means for the restoration of the malposed teeth to their normal position. Thus, it occurred to Angle, for instance, "that notwithstanding the great number of appliances then in existence, each one must act, if at all, by exerting force upon malposed teeth in one of three ways: namely, by pushing, pulling or twisting." This idea immediately simplified matters. He then proceeded to manufacture such instruments as were capable of performing these movements and made them available for general use. With this step, the profession was relieved from the worry concomitant with the invention of appliances. For, whether the marketed articles were employed as such or their principles utilized by imitation, there was something tangible and reliable at the disposal of the practitioner. From that time on to the perfection of the most complicated orthodontic appliance now obtainable in the dental depots, the profession has ceased to worry about the *principles involved* in inventing and constructing appliances. The question of paramount significance now rests with the proper choice and correct application of those on hand. The time, worry and

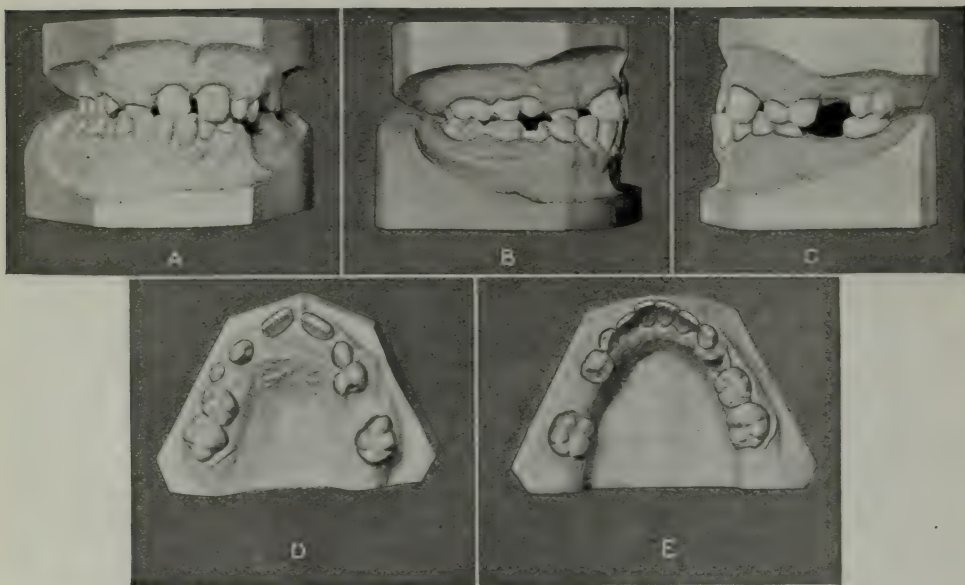


energy thus gained are more profitably used for study in developing better judgment for a keener discrimination of the underlying conditions of the cases themselves, as to their etiology, pathology and prognosis.

The mechanics, therefore, involved in the construction of orthodontic appliances may now be considered under two phases. One phase would be represented

the possibility of purchasing or copying in part or in entirety the appliances in use at the present time. I am thoroughly convinced that, in so far as obtaining an appliance is concerned, little more inventive genius, special talent, knowledge of physics and mechanical skill are required today, than is necessary in the construction of a prosthetic piece—a crown, a bridge or a plate.

FIG. 11.



Casts of dentition in malocclusion. A. Front view, showing lingual occlusion of upper right half of dental arch. B. Right side view, showing occlusion of buccal teeth and missing upper canine. C. Left side view, showing occlusion of buccal teeth and missing left upper canine. D. Occlusal view of upper dental arch, showing form of arch, position and number of teeth present. E. Occlusal view of lower dental arch, showing form of arch, number, condition and position of lower teeth.

by the actual making of them, and the other, by the assemblage and application.

The actual making of an appliance, though it requires some skill and experience, is not an insurmountable obstacle. Backed by the average skill of the dentist, a little practice will enable every one to make a band, bend a wire, or construct a plate or any form of the manifold existing orthodontic contrivances. This can be considerably facilitated by

#### INEFFICIENCY OF APPLIANCES VS. FAVORABLE RESULTS.

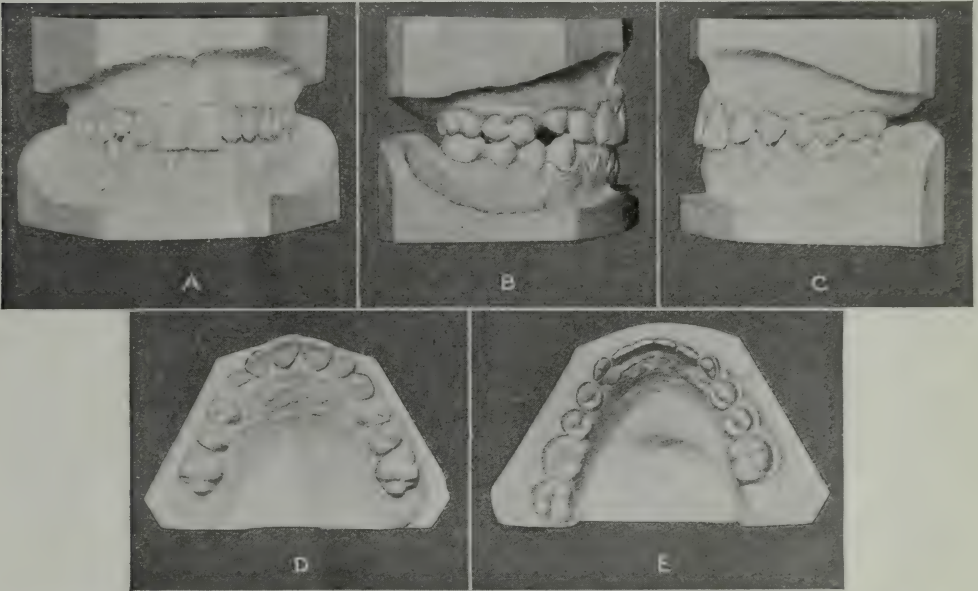
I cannot quite agree with the implications of some mechanical authorities that orthodontists construct and operate appliances with a "customary disregard of the laws of physics" and that the treatment of malocclusion of the teeth, by mechanical means, can be conducted only by due observance of engineering



principles. It is true that orthodontists do not know much about engineering, but this is counterbalanced by the fact that the engineer knows just as little about orthodontia. The appliances hitherto used in orthodontic practice seem to be constructed in sufficient accordance with the physical laws necessary to obtain practical results. More-

then the reactions of the teeth upon the appliance are the only external forces acting upon the structure" is theoretically correct, but practically it cannot be proved. The explanation of the appliance being in static equilibrium "just as the great steel arch carrying a railway across Hell Gate is in equilibrium" is very illustrative, but not convincing.

FIG. 12.



Casts of dentition shown in Fig. 11. After treatment. A. Front view, showing result of treatment and retention. B. Right side view, showing change in occlusion of buccal teeth and tardiness of eruption of upper canine. C. Left side view, showing perfect occlusion, almost fully erupted upper canine and presence of lower second molar; development on this side being considerably in advance of that on the right side. D. Occlusal view of upper dental arch, showing change in form and size as compared with Fig. 11 D. E. Occlusal view of lower dental arch, showing change in form and size as compared with Fig. 11 E.

over, the results hitherto obtained by such appliances served to place orthodontia in the exalted position it now occupies in the realm of medicine. The introduction of the professional engineer into the orthodontic domain has so far been a negligible factor in this progress.

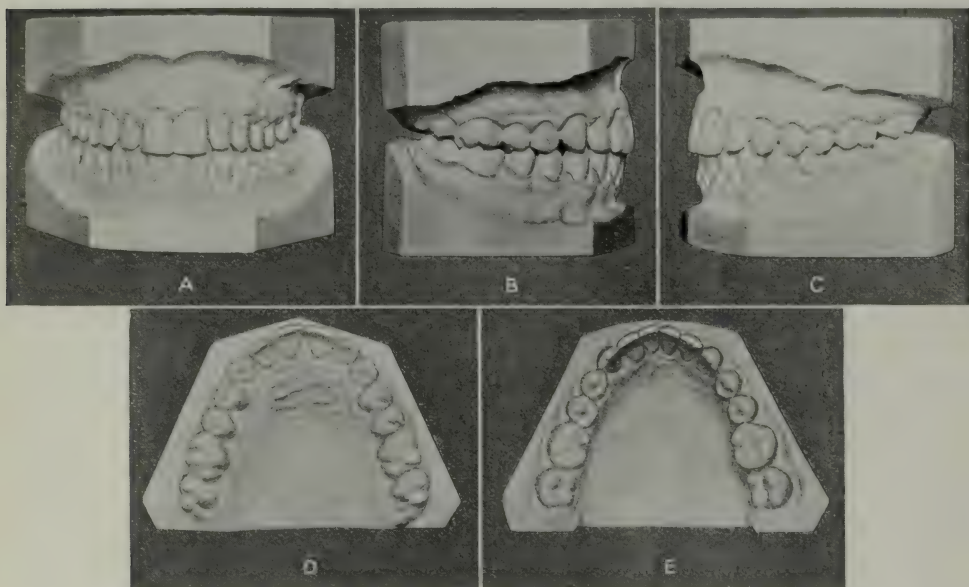
The conception of the engineer regarding orthodontic problems is interesting, but not important. The idea that "if an appliance is attached only to the teeth,

An appliance when adjusted upon the teeth is not reacted upon by the movement of the teeth alone. There are the forces of occlusion to be accounted for, *i.e.*, the occlusal inclined planes, the influences of the muscles of mastication, deglutition, etc., also the character of the food substances masticated. Besides these there are other objects that interfere with the effective manifestation of the forces resting in the appli-

ance. For instance, besides food, children are known to chew all kinds of objects ranging from a piece of chewing gum to a lead pencil or a pen-holder. They are also known to meddle with the appliance, interfering with its efficiency. Thus, the damage to the appliance may range from the loosening of a ligature or a band to the breakage of various sorts

despite all sorts of interferences there is a remarkable improvement. Fig. 11 (A, B, C, D, E) illustrates a case in the treatment of which insurmountable difficulties were encountered. No appliance or part of it was exempt from removal, loss or distortion. As the patient was a suburbanite, the treatment proceeded with greater difficulties. For in-

FIG. 13.



Casts of dentition of case shown in Fig. 11, two years and four months after removal of all appliances. A. Front view, showing improvement of occlusion due to function. B. Right side view, showing persisting tardiness in eruption of upper canine and presence of second molars. C. Left side view, showing progress of adaptation to function. D. Occlusal view of upper dentition, showing change in conformation of the dental arch as affected by the eruption of the second molars. E. Occlusal view of lower dentition, showing completion of eruption of second molars and less change in form than that in the upper.

of attachments. Children are also known to remove and lose the apparatus in its entirety. We must recognize and admit that the efficiency of the appliances in the patient's mouth is usually manifested in a very low degree at best. It at times seems that results in certain cases are obtained not *because* of the efficiency of the appliance, but rather *despite* its inefficiency. We are often amazed at the progress of a case when

stance, he could come into town only once a week. Of course, this would be sufficiently frequent under favorable conditions, but in this instance, where something would happen every hour of the day, the frequency of the visits was considered inadequate. Special arrangements were then made with a local dentist, to replace any minor part of the appliance that might come off during the week. The major parts that were broken



or distorted had to be left alone until the visit to my office. Owing to these conditions, the treatment proceeded with extreme tardiness. But, by the exercise of sufficient patience and perseverance, the result as shown in Fig. 12 (A, B, C, D, E) was obtained.

As there were considerable developmental irregularities in this case, it was kept under long-continued surveillance after the retaining appliances had been discarded. As may be seen in Fig. 12 B, the upper right canine is not quite fully erupted and the second molars have as yet not appeared on this side. On the left side (Fig. 12 c), however, the canine and the lower second molar are fully erupted, while the upper second molar is not present. The casts presented in Fig. 13 (A, B, C, D, E) show the result two years and four months after the removal of all appliances. It could be claimed that only through the efficiency of this or that appliance such results are obtainable. But it would be misrepresentation to claim anything for the efficiency of the mechanism when inefficiency was so largely rampant in this instance. This must, however, not be considered the only case with such a history, as several other cases of extreme malocclusal conditions can be shown with unexpected equally good results, *despite* the inefficiency in the mechanical contrivance.

#### ENGINEERING PRINCIPLES VS. PATHOLOGIC CONDITIONS.

Again, there are some cases that respond to mechanical treatment in such peculiar manner as would baffle the most expert of engineers. For instance, with the most perfectly made and accurately adjusted appliance, with careful attention of the patient and all mechanical conditions favorable for good results, no improvement is noticeable, or, if there is any improvement, it is only short lived. Those cases usually relapse in a manner that is most surprising, and *despite* the most perfect and ingenious mechanical contrivances the results obtained will not last. In a separate contribution this

problem will be reported and dwelt upon at length. Suffice it in this connection to say that these relapses are due to anomalies in growth of the individual which cannot be counteracted or overcome by the most perfect mechanics employed.

I repeat, therefore, that we must not be misled by the idea that, in order to obtain good results in orthodontia, the appliances need necessarily be constructed with logarithmic precision. In the treatment of malocclusion of the teeth, it is unquestionably important to have a general knowledge of physics. But this provision is usually taken care of at the beginning of all professional training by including physics in the requirements for admission to the dental schools. In my estimation, it is preposterous to assume that in order to be able to manipulate an orthodontic appliance, it is necessary to undergo a course of instruction in higher mathematics and civil or mechanical engineering. If one is well grounded in the principles of biology, morphology, anatomy, physiology and pathology and has the general knowledge of physics as the average dentist has, or should have, he is more qualified to treat malocclusion of the teeth than the civil engineer or mechanical engineer without the biologic foundation.

#### QUALITIES OF AN EFFICIENT APPLIANCE.

The *application of orthodontic devices* for the movement of teeth calls for a different series of considerations. Thus, it is not only of importance that their construction should be mechanically correct, but also their attachment to the teeth requires special consideration. The appliance is to exert force, and, although the force required is infinitesimally small, it must be exerted in the *proper place and in the right direction*.

This problem has been the cause of considerable misinterpretation of actual phenomena. The idea of force gave rise to the assumption of resistance—mechanical resistance. Resistance, in turn, created in the minds of most of us a notion clearly expressed by Herbert A.



Pullen, that "the appliances used for orthodontic treatment, being similar in principle to certain machines in use outside of the mouth, are necessarily amenable to the same laws or principles of mechanics which govern the action of applied forces in general." Dr. Pullen, nevertheless, realizes that such comparison would require a considerably elastic imagination. For, considering the instability at the points of resistance in the orthodontic machine, he admits that the "resistance of those forces in the mouth can never be regarded in the absolute, but it must be *theoretically assumed* in the mechanics of orthodontia in order that the nearest approach to absolute stability may be attained through the application of the principles of mechanics governing force and resistance."

#### ANCHORAGE IN ORTHODONTIA.

It is to be regretted that such assumptions are made for the sake of explaining vital processes on the basis of mechanics. Little is realized that by such interpretation we only get into more difficulties and open the way for considerable misunderstanding. Thus, it is necessary to resort to *anchorage* as a means of resistance to the force to be applied.

*Anchorage in its true sense does not exist in orthodontia.* There is no point in the mouth to which an appliance may be attached that can resist force without being affected by it. The force necessary for inducing cell changes in the tissues constituting the alveolar process is so small that no device, however cleverly conceived, or no combination of attachments, however skilfully executed, will succeed in avoiding it. And were it possible to do so, it would probably be of no avail, for in the greatest majority of cases, it is necessary to move the anchor teeth themselves. For instance, in all Class II and III cases the entire dental arch of each jaw, besides changing in form, is also undergoing a change in position. This is brought about by the effect of the stress put upon them by intermaxillary force which is essentially that

exerted by elastic bands. Thus, although we imagine in this instance that certain teeth are used as anchorage for resisting force delivered elsewhere, we are really moving the anchor teeth as well as those that are supposed to be moved. But even without the intermaxillary force, anchor teeth are moved when they are "rotated," or when the dental arch is to be "expanded." It is, therefore, an illusion to imagine anything like an anchor point in the mouth. It only serves to mislead, and in many instances with damaging effects. For those accepting such views and relying on them implicitly are liable to do considerable harm until they realize that despite the anchorage obtained according to the best authorities, it is necessary to exert utmost care in order to prevent anchor teeth from migrating to unknown regions. The profession in general is silently, perhaps unconsciously, coming to accept this view judging by the *furor* the "lingual arch" is making. This appliance, if properly constructed and manipulated, will have a less harmful effect on the teeth used as anchor points. But when necessity arises to move the anchor teeth also, then this appliance is subject to the same shortcomings as the rest of them. Recourse is then taken in the use of both a lingual and a labial arch, in which case the former really functions as a support to the anchor points.

A true conception of anchorage with reference to orthodontic procedure should be based on the *application of force with the aim in view that when resistance is utilized, it should in turn affect and guide the so-called anchor teeth into their proper positions* as gaged by occlusion. With extremely few exceptions, all teeth in a dental arch must be moved in the treatment of a case. There is no one tooth in a dentition requiring treatment that is exempt from it. Utilize, therefore, the force necessary for tooth movement in general, in such a manner as to transmit its influences in all directions. As will be shown presently, this can be successfully accomplished by hav-

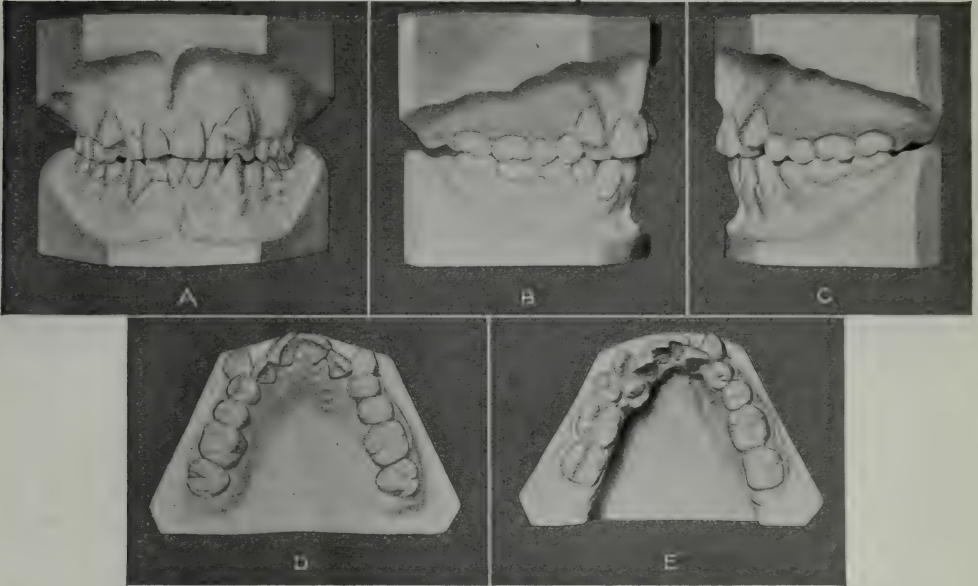
ing a clear conception of the forces concerned and the end to be attained.

#### APPLICATION OF FORCE VS. THOROUGHNESS IN DIAGNOSIS.

Thus, before an appliance is adjusted to perform the function involved in or-

with that, but in order to do so he must be able to distinguish between the simple and the complex. In order to be able to make these distinctions, considerable knowledge on diagnosis of malocclusal conditions will be necessary. Even the most able orthodontists are often mis-

FIG. 14.



Casts of dentition in extreme malocclusion. A. Front view, showing position of incisors and canines; also underdeveloped condition of alveolar process in those regions. B. Right side view, showing premolar-molar relationship and proximity of upper lateral incisor and the first upper premolar. C. Left side view, showing the same occlusal relationship in the premolar-molar series, proximity of lateral and first premolar in the upper jaw, as well as lower canine and second premolar in the lower jaw. D. Occlusal view of the upper dental arch, showing extreme diminution in size, the canines being completely shut out from the alignment of the teeth. E. Occlusal view of the lower dental arch, showing extreme lack in development in the anterior segment of the alveolar process, with the consequent "bunching" of the teeth. Note the position of the right lateral incisor, canine and first premolar, as well as that of the left lateral, canine, first and second premolars.

thodontic treatment, it is essential, for instance, first to know exactly *why* and *where* the force is required before we think of *how* to apply it. In other words, we must first be able to *diagnose a case* before it is treated. And there is the "rub." It is usually argued that the general dental practitioner should be able to treat all simple cases. I quite agree

led in this respect. Very frequently, the simplest-looking case turns out the most complicated in treatment and *vice versa*. This, in my estimation and in the estimation of a number of other orthodontists, is the great difficulty yet to be overcome in orthodontia.

Orthodontia has progressed so far as to begin to realize that despite its re-

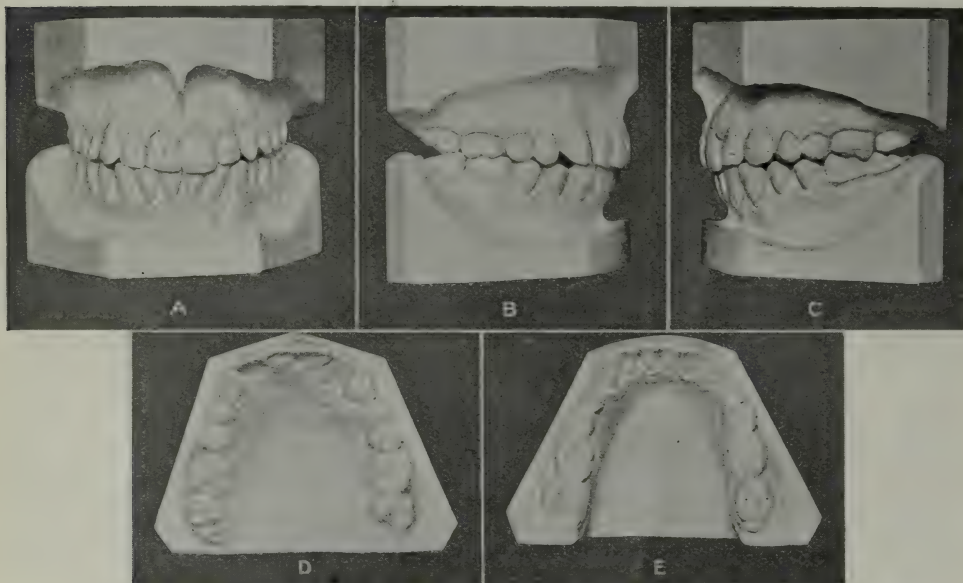


markable possibilities, it is not exempt from those inexorable laws that place the barrier of limitation to life itself as well as to the various phases within which it is manifested. And this is a very good sign. It shows a healthy growth. The pioneers of orthodontia are just awaken-

about by the revelation of the fact that there are *limits* not only to the *mechanical procedure in orthodontia*, but also to the *tissues operated upon*.

We arrive, therefore, at a paradoxical conclusion in this respect, namely, although mechanics or mechanical ability

FIG. 15.



Casts of dentition of case shown in Fig. 14 after completion of treatment and retention.

- A. Front view, showing change in alignment and relation of the incisors and canines.
- B. Right side view, showing accommodation of canines in their allotted places, with change in mesio-distal relationship of the premolar-molar series and without unfavorable change in the inclination of the long axis of the incisors. Note the development of the alveolar process in the apical region of the incisors as compared with that in Fig. 14 B.
- C. Left side view, showing accommodations of upper canine, lower lateral incisor, and first premolar, without any unfavorable change in position of the long axes of the other teeth.
- D. Occlusal view of upper dental arch, showing extreme modification in form and size, as compared with Fig. 14 D.
- E. Occlusal view of lower dental arch, showing extensive tooth movement performed. Compare distance between left lateral incisor and second premolar in Fig. 14 E and in this illustration.

ing to the fact that in order to gain a mature aspect of the problem confronting them, extensive study in collateral branches of various *sciences* and *arts* is essential. Curricula are just now being experimented on for the better equipment of the future orthodontic specialists. And all this has been brought

necessary in orthodontic practice is rather simple and within easy reach of every intelligent dentist, the *conditions that qualify* the putting of such ability into execution are *very complex* and not generally mastered even by all orthodontists. In other words, it is not difficult to learn *how* to treat a case of



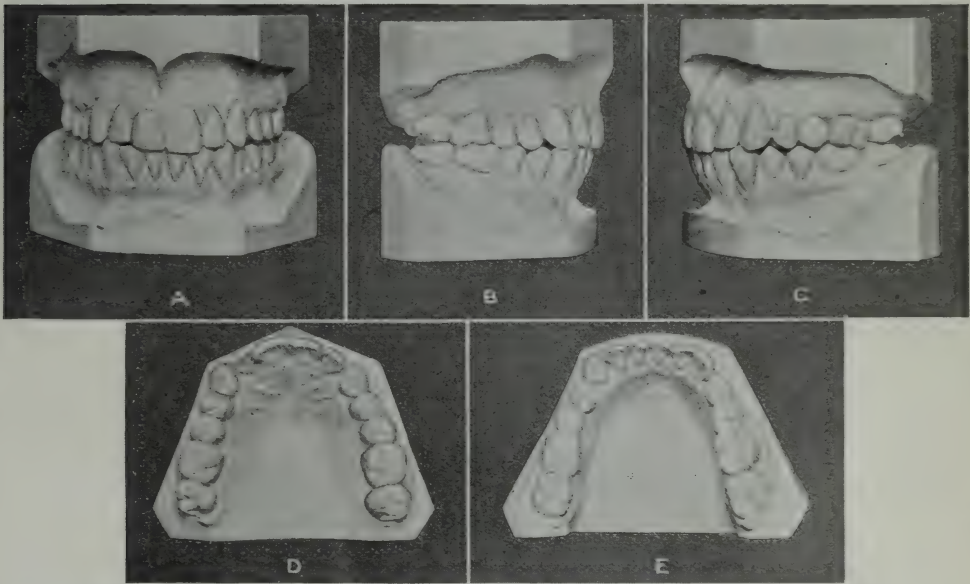
malocclusion, but it is far from simple to know *why* and *when* to do it, and above all, when and why *not* to do it. Should the dentist then treat cases of malocclusion? Yes. But only when it cannot be avoided. And then only in a subordinate manner under the supervision of a most able, upright, honest and sincere orthodontist, the orthodon-

dentist practitioner when conditions warrant, if the specialist in orthodontia should so decide.

#### INDIVIDUAL SKILL IN APPLYING MECHANICAL PRINCIPLES.

4. *Are the mechanical principles of an appliance to be blamed for the failure*

FIG. 16.



Casts of dentition of case shown in Fig. 14, two years and a half after all the appliances were discarded, showing the character of result obtained after the functional adaptation of the teeth in their new positions, supported by their newly developed surrounding structures. A. Front view. B. Right side view. C. Left side view. D. Occlusal view of upper dental arch, showing no unfavorable modification in form from that in Fig. 15 D. E. Occlusal view of lower dental arch, showing no unfavorable change in form from that in Fig. 15 E, with the exception of the slight lingual migration of the left first premolar.

tist who will come to the aid of the dentist not with the sole prospect of personal gain, but rather with the main aim in view of helping the profession and benefiting the patient. Like the general practitioner in medicine who, in special instances, takes his patients to a specialist and then follows the specialist's instructions in the subsequent care, so also the treatment of the orthodontic case can be taken care of by the general

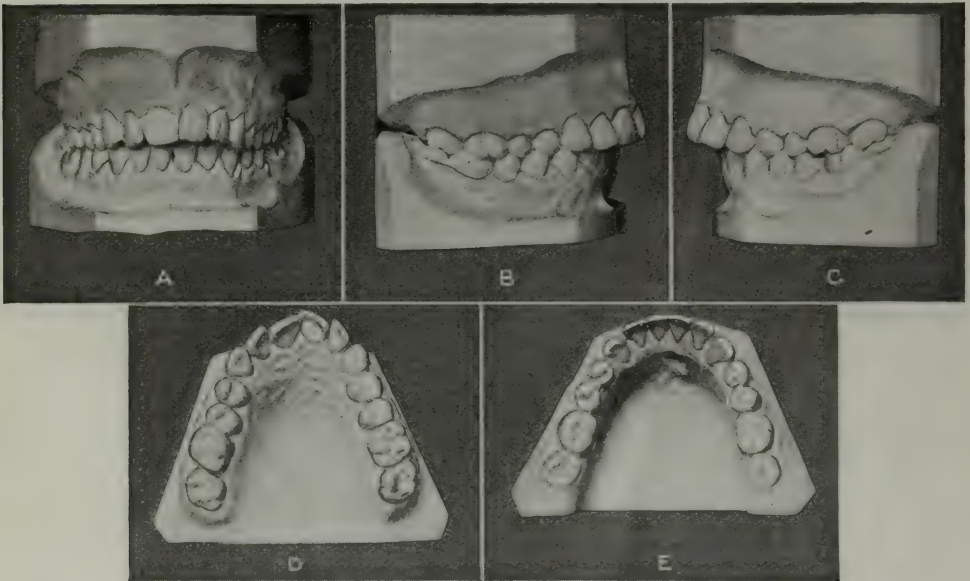
*or credited with the success of a case? That is, does the skill of the operator in the treatment of a case of malocclusion entirely depend upon the virtues and vices of the appliances, or are the appliances merely his means to obtain an end, and subject to his talents and ability?*

The earliest signs of intelligence evinced in the evolutionary history of man are intimately associated with indications of his artistic proclivities. As

early perhaps as 50,000 years ago, when the Cro Magnon race came upon the scene of evolving man, artistic talents became manifest. The primitive stone implements made by them far exceeded in perfection those made before or after them. Also the results obtained in various attainments by the use of those implements surpassed those of other races.

*talents* developed throughout the entire course of human evolution far surpass any particular implement yet devised by man. The art, *per se*, of inserting a gold foil filling by far exceeded that of making a gold inlay. The former depended entirely upon the innate talent and artistic skill, while the latter is subject to the efficiency of various mechanical

FIG. 17.



Casts of dentition in distal occlusion. A. Front view, showing excessive lapping of upper incisors. B. Right side view, showing distal occlusion of lower teeth and lapping of upper incisor. C. Left side view, showing like manifestations as under B. D. Occlusal view of upper dental arch, showing peculiar form due to crowding, lapping, and "protruding" of anterior teeth. E. Occlusal view of lower dental arch, showing even alignment of incisors and spacing between several teeth, despite the crowded condition in the upper arch.

This shows that associated with the very development of man, there is a human tendency which influences each group as well as every individual of each group "to develop *its own peculiar talent*, and to grow into the fullest usefulness which we assume to be the natural right of all." (Merriam.)

How exceedingly misled are we all on this particular aspect! Few of us are impressed with the fact that *innate*

devices that must be resorted to in its manufacture. Assuming *all* conditions to be equal, it is questionable whether the perfect *mechanical adaptation* of a gold foil filling to the cavity walls of a tooth can be equaled by a gold inlay. If the progress of chemistry had not come to its assistance in the manufacture of cement, the inlay on its own merits could hardly have enjoyed the popularity it has today. The contribution of the

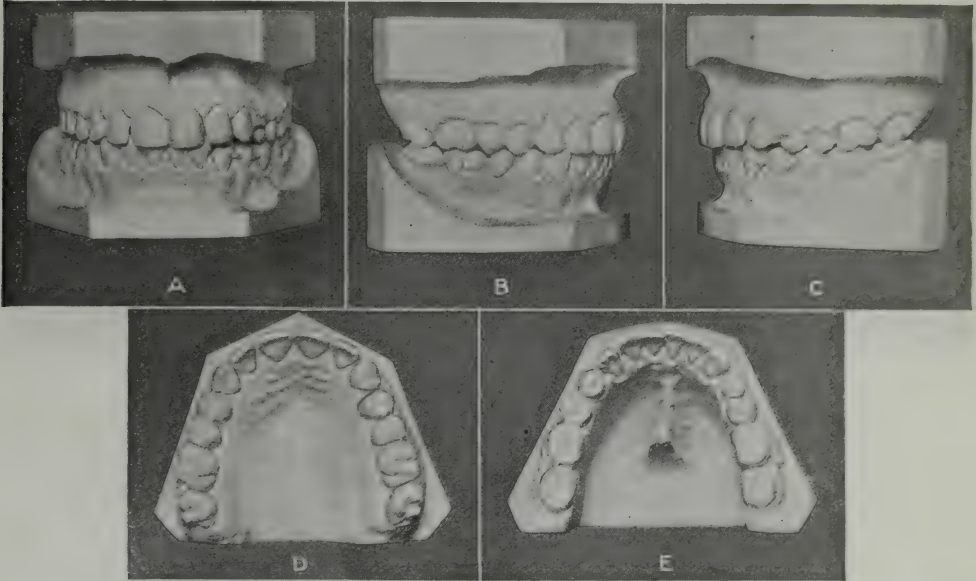


inlay to the advancement of dentistry consists in enabling the masses to raise lower standards to a higher level, while the former talents contributed the highest skill, but in the least frequency.

Despite the various efforts at standardization of implements and procedure in the attempt at increasing the output, so

other hand, there still are in many instances uniformly excellent results produced. It may, therefore, be said that the treatment of malocclusion of the teeth today and its progress in the near future depend not so much on the form of the appliance in vogue, but rather on the artistic skill and natural talent of the

FIG. 18.



Casts of dentition shown in Fig. 17 after completion of treatment and retention. A. Front view, showing change in position and occlusion of anterior teeth. The spaces between the centrals and laterals are due to the peculiar form of the laterals. Their form, due to morphogenetic influences, predetermines their position, and this is assumed in response to functional activity. (See Fig. 19 A.) B. Right side view, showing establishment of normal mesio-distal occlusion. C. Left side view, showing establishment of normal mesio-distal occlusion. D. Occlusal view of upper dental arch, showing modification in form of the arch as based on the form of the teeth. Compare this form with that in Fig. 17 D. E. Occlusal view of lower dental arch, showing change in form and elimination of spaces seen in Fig. 17 E.

to speak, no noticeable progress in that direction has as yet been made in orthodontia. The treatment of malocclusion of the teeth, like the insertion of gold fillings, has as yet not been dislodged from its pedestal in the realm of art. Despite the uniformity in appliances on the one hand, there still are individual differences in the attainment of results, and despite the diversity of systems on the

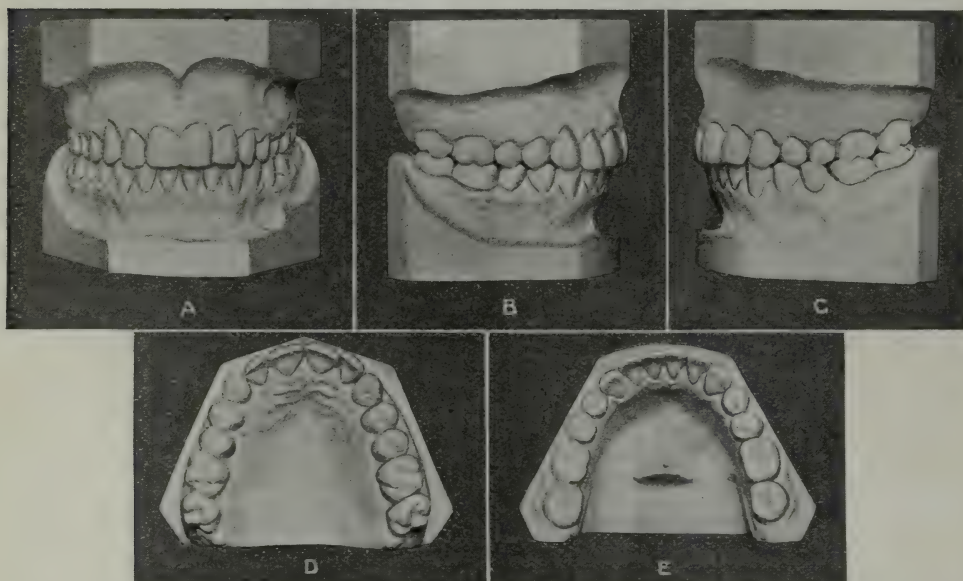
individual employing it. We must not commit the error of imagining that the "ribbon arch" is the best appliance because Angle or anybody else has accomplished good results with it; nor, that the Jackson crib is of *no* practical value because "Tom Jones" had some miserable failures with it; nor that the "lingual" arch is the appliance *par excellence*, because Mershon and Lourie have



done some creditable things with it. The plain expansion arch, despite its "ancient history," has been the means of obtaining considerable good results, and in more instances than any other one appliance. Moreover, I am quite convinced that in the hands of some orthodontists, it cannot be excelled by any of the aforementioned devices.

The general notion prevailing in the profession that the virtues of a certain form of appliance will outweigh our shortcomings is most astonishing. The degree of our successes will only measure up to the knowledge, talent, skill and ability regardless of the means employed. As a word of caution to the uninitiated, it may be said that it is often more ad-

FIG. 19.



Casts of dentition shown in Figs. 17 and 18 one year and six months after the appliances were discarded. A. Front view, showing closing-up of spaces seen in Fig. 18 A. B. Right side view, showing normal mesio-distal relation not changed from that in Fig. 18 B. C. Left side view, showing normal mesio-distal relation not changed from that seen in Fig. 18 C. D. Occlusal view of upper dental arch, showing no change in form from that in Fig. 18 D. E. Occlusal view of lower dental arch, showing arch formed retained as in Fig. 18 E.

To say that it is the appliance that accomplished results and not the art of using it is erroneous and misleading. Given a certain type of appliance and like conditions, it will yield different results in conformity to the skill of the orthodontist manipulating it. And *vice versa*, given an assortment of diverse forms of appliances operated under like conditions and by orthodontists of like skill, talent and ability, we shall have results of a like degree of excellence.

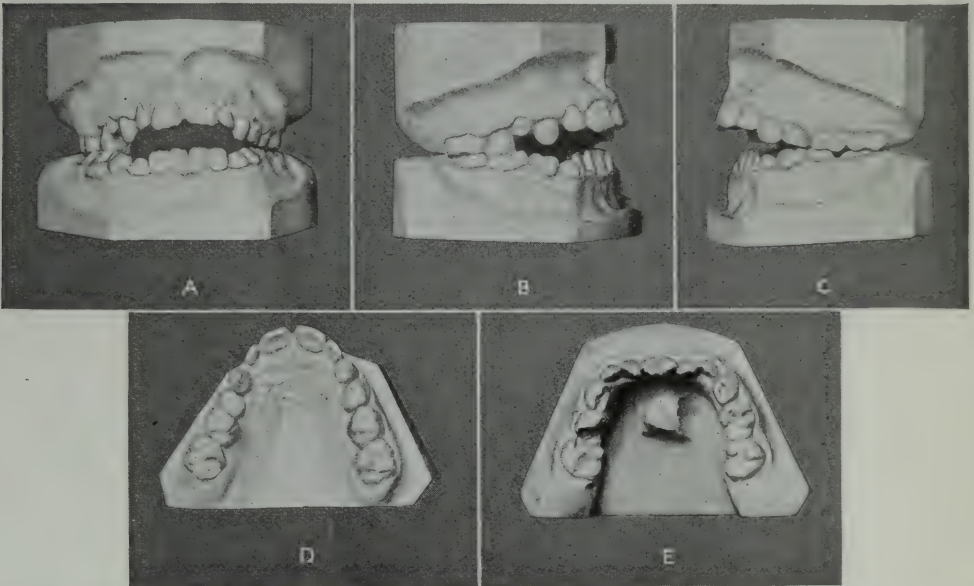
visible to cling to that type of appliance that one becomes proficient in manipulating than to relinquish this proficiency for a superior appliance and take the chance of developing therewith an inferior technique. In other words, it is better to be the possessor of such skill as to be able to control the appliance than to possess an appliance that will control one's skill.

To control the efficiency of an appliance is what taxes the utmost ability of

an orthodontist. For an appliance will do what we desire it to do and at the same time it will do some other things besides. Again, an appliance may be prevented from doing some things that we do not wish it to do, but fail to do what we desire it to accomplish. It is only by the cultivation of absolute mastery over the possibilities of an appliance that it

CASE I. Fig. 14, A, B, C, D, E, represents the casts of a case of extreme malocclusal condition (Class I, Angle). According to the opinion of some ultra-modern faddists, the case should have been "surveyed" before treatment was attempted; others would have advised a particular kind of new appliance to be used, especially suitable for such type of case; again, some would recommend that the patient be put through deep breathing exer-

FIG. 20.



Casts of dentition in malocclusion (Class I, Angle) with "open bite." A. Front view, showing extent of aperture between upper and lower incisors and canines. B. Right side view, showing the second deciduous molars and first permanent molars, the only teeth in occlusal contact. C. Left side view, showing the same conditions as in B. D. Occlusal view of upper dental arch, showing the constricted condition in the anterior region besides the *infra* position of the incisors and canines. E. Occlusal view of lower dental arch, showing extreme manifestation in the position of the anterior teeth and form of arch.

becomes an instrument to express our will in just proportion as necessities demand. Viewed from this aspect, the treatment of malocclusion of the teeth becomes an art that ranks foremost in the art of healing, and our special talents then become an asset that places us above the attainments of the mediocre. A few illustrations will bear evidence of these beliefs:

cises, while others would confine the calisthenics to the muscles of mastication, etc. I proceeded in accordance with the principles outlined. The appliance used was one employed in my routine practice since 1908, and the other requirements for the completion of the case were supported by information gained through various studies of biologic significance. As it was agreed to show no partiality to any appliance in this paper, the type of device used will not be dwelt

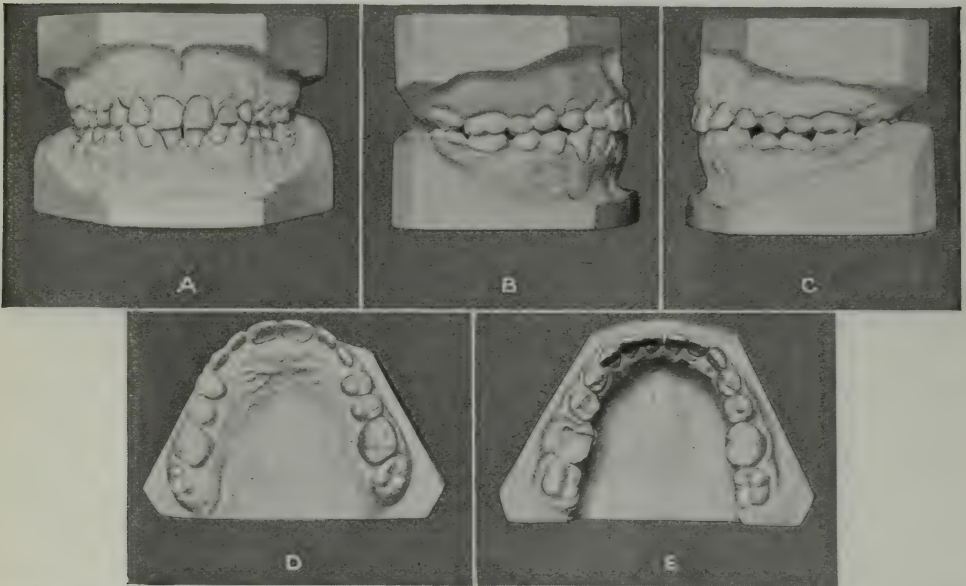


upon. As may be seen, the alveolar arches are extremely underdeveloped, lacking the necessary room for the accommodation of the teeth in their respective positions. By gradual stimulation, growth was artificially obtained in the necessary regions. The regions mostly affected were those involving the upper canines and the lower alveolar segment situated between the right first and the left second premolars. The excessive amount of

ticed that despite the extreme movement of the teeth in the horizontal plane, the angle of inclination of their long axis is not changed.

CASE II. Fig. 17, A, B, C, D, E, represents the casts of a case in distal occlusion (Class II, Angle). In this case it was necessary to change not only the positions of the teeth individually, but also shift the dental arches antero-posteriorly to overcome the distal re-

FIG. 21.



Casts of dentition shown in Fig. 20, after completion of treatment and retention. A. Front view, showing change in occlusion of the incisors and canines. Compare with Fig. 20 A. B. Right side view, showing occlusal contact of *all* the teeth. Compare with Fig. 20 B. C. Left side view, showing similarly established conditions as in B. D. Occlusal view of upper dental arch, showing modification in arch form as compared with Fig. 20 D. E. Occlusal view of lower dental arch, showing change in position of anterior teeth and modification of arch form. Compare with Fig. 20 E.

bone development that was required in those regions can only be gaged by comparative measurements of Fig. 14 and Fig. 15. Also the modification in form of dental arch will be appreciated by a careful study of Fig. 14 D and E, as compared with Fig. 15 D and E. And yet, this result was obtained without the aid of the various "new-fangled" ideas. That this result was of a lasting quality is shown by casts in Fig. 16, which were prepared from impressions two years and a half after all appliances were discarded. It should be no-

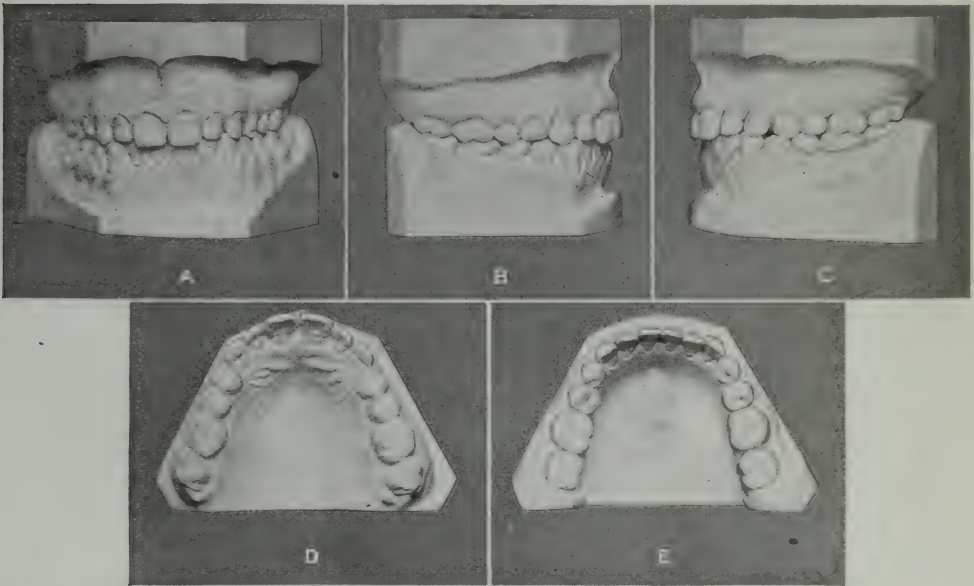
tion of the lower teeth to the upper. As may be seen in Fig. 17 A, there was considerable lapping in the upper incisor region. To correct this it was necessary to "expand" the upper dental arch in that region, "rotate" those teeth, and bring the lower incisors into proper occlusion with them. As a modification in form of the upper arch was necessary, it was deemed best to base that on the form of the teeth. As may be seen in Fig. 18 D and E, showing the case at completion of treatment, the forms of the arches were con-



siderably changed, but there developed spaces between the upper centrals and laterals, as may be seen in Fig. 18 A. However, after the lapse of one year and a half, these spaces closed up (see Fig. 19 A and D), but as may be seen in these figures, there is a slight lapping of the laterals over the centrals. This manifestation, however, is not a relapse, but rather a normal occurrence due to morphogenetic influences. As has been explained in a contribution on "The Relationship of Form

CASE III. In this case, Fig. 20, A, B, C, D, E, a form of malocclusion is presented that differs materially from the two cases previously shown. While in the other two cases it was necessary to perform tooth movements in a horizontal plane only, in this case vertical movement was essential to bring the incisors into the required level for the establishment of normal occlusion. The changes brought about in the anterior region will be plainly visible when Fig. 20 A is compared

FIG. 22.



Casts of dentition shown in Fig. 20, three years after all appliances were discarded. A. Anterior view, showing permanency of incisor and canine occlusion. B. Right side view, showing improvement in occlusal relations as compared with Fig. 21 B. C. Left side view, showing progress in improvement of occlusal relations from that in Fig. 21 C. D. Occlusal view of upper dental arch, showing retention of form established in Fig. 21 D. E. Occlusal view of lower dental arch, showing no change in form from that obtained in Fig. 21 E.

to Position in Teeth and Its Bearing on Occlusion," this manifestation is found in a large percentage of normal dentitions. It is evident that though this lapping was established, the forms of the dental arches and the occlusion remain unchanged, as may be seen by comparing Fig. 18 with Fig. 19, representing the casts a year and a half after all appliances were discarded. This case was examined two years after these casts were made (three and a half years after discarding all appliances), and it showed the result unaltered.

with Fig. 21 A. And that this change is permanent will be evident by Fig. 22 A, prepared from impressions obtained three years after all appliances were discarded. The occlusal relationship established is illustrated in Fig. 21 B and C, and its permanency in Fig. 22 B and C. The change in form of the dental arches may be appreciated upon a comparison of the casts in Fig. 21 D and E with those in Fig. 20 D and E, and that it is permanently established may be seen in Fig. 22 D and E. The marks in the form of horizontal lines seen on the teeth—on the

labial and lingual surfaces of the incisors and canines and on the occlusal surfaces of the premolars and molars—are due to enamel hypoplasia to be accounted for on some future occasion.

In summing up the ideas advanced in these remarks, it may be said:

1. That orthodontia as a whole can under *no* circumstances be regarded as a problem in mechanics alone.

2. That the processes involved in the natural movement of the teeth are intimately associated with inherent tendencies of the teeth and their supporting environment.

3. That the tissues involved in orthodontic procedure do respond to mechanical forces, but not in accordance with physical laws.

4. That the teeth are moved artificially by processes of a *biomechanical* nature.

5. That the construction of orthodontic appliances constitutes the only mechanical process in orthodontia and requires no extraordinary skill nor special engineering or mathematical training.

6. That the manipulation of orthodontic devices in the treatment of malocclusion of the teeth is an art and that it is of considerable advantage to be endowed with special artistic talents besides mechanical skill in order to excel.

7. That orthodontic treatment can be carried out by the dentist, but only in a subordinate manner, *i.e.*, under the special supervision of an expert, upright, honest and sincere orthodontist. One who has the interests of the patient at heart and is convinced to the best of his judgment that in exceptional cases it can be furthered by a combined effort, and

8. That only by a due recognition of the facts herewith presented, will we gain a clear conception of the problems confronting us, at the same time eliminating all undue influences that tend to mislead and confuse.

*The main aim is to have a clear issue. Even if wrong, let us clearly see it so. Confusion befalls our views and curtails our judgment. A clearly visible error, on the other hand, is the shortest path to the goal of truth.*

"Get but the truth once uttered, and 'tis like  
A star newborn, that drops into its place,  
And which, once circling in its placid round,  
Not all the tumult of the earth can shake."

—Lowell.

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[See also *Discussion*, as reported under "Proceedings of Societies," this issue.]

## Bridge Attachments Permitting Conservation of the Pulp and Tooth.

By W. J. ROBINSON, D.D.S., Philadelphia, Pa.

(Read before the District of Columbia Dental Society, Washington, D. C., June 9, 1920.)

IT may appear somewhat ironical to state that dentistry is destined to attain its scientific evolution of practice as much through successive obsessions of faddism, with their lessons of failure, as it is through the findings of its scientific workers. Dental history for the last half century compellingly testifies to the frequency of new modes of *practice*, new *doctrines*, rapidly overwhelming the entire profession, only to become, a little later, dissipated through the realization that the promises, which at first seemed so alluringly hopeful in their beneficent aims, were founded upon over-enthusiasm or incorrect assumption, and therefore yielded little as to result but very much as to disappointment.

The history of medicine furnishes a striking analogy to what has been and is taking place in dentistry, and it is quite obvious why this is true. Identical factors are basically related to both professions. For centuries the human mind eagerly accepted all sorts of ideas, without regard to the warrant for their validity, accepting them because of the hopes which they held forth for the attainment of definite benevolent aims, or else because they were sponsored by those in positions of authority. For over a thousand years the intellectual spell of Aristotle enslaved the mentality of man, and might still be over us, if no one had arisen to challenge existing doctrines. It is not necessary for the argument to recite the numerous instances wherein great hopes born of a new dental thought ended in failure. This lesson

has been impressed upon every one of us. But what it seems has still to be learned by a majority of dental practitioners is that, as long as we are willing to accept statements just because they hold forth great hopes, or because they are sponsored by those in positions of authority and not because they have been tested by a strict scientific procedure, just so long will we continue to suffer keenest disappointment and labor under mystifying confusion.

I do not think I can place anything before you which is of greater value to your professional efficiency, or to the profession of which each of us should be a responsible unit, than to emphasize the necessity for greater caution in accepting doctrines of practice until we are assured of the facts, *the real facts*, underlying these doctrines and claims. If we are to escape the pitfalls of the past, if we desire to impress upon all who seek our services the high professionalism of our calling, we must avoid impressing upon them theories and methods of practice that fizzle into nothingness long before they reach maturity.

Dentistry of today is divided into schools. We have the school which does not believe in pulp devitalization. This school maintains that all pulpless teeth are a menace to the health of the individual; and we have the school that does believe in devitalization, and states that all roots, or nearly all roots, can be perfectly filled, and made to permanently subserve a useful purpose. Then we have the school that inclines to conser-



vatism. This school believes that infected, incurable, pulpless teeth should be removed, but that a tooth which has lost its pulp and is not infected may be treated so that it will remain a useful member of the arch.

Among prosthodontists we have the same diversity of opinion; we have the fixed or stationary bridge advocate, the removable bridge advocate, and the movable-removable bridge advocate.

Do you wonder that the average dentist is unable to decide what to do?

The difficulty with bridge work up to the present time has been its utilization by too many practitioners as a means of increasing their incomes, in short, commercialism too frequently has been the dominant thought rather than the conscientious application of our knowledge to the needs of the case at hand. A conscientious bridge worker does not approach the application of a restoration with the sole idea of selling something. Lately there has been too much of the salesman idea talked into dentistry. You know a good salesman is supposed to be one that can sell something different from what the buyer wants. We must abandon that idea in dentistry and try to give our patients not what will cost the most but what will render them the best service.

The conscientious prosthetist—we will call him a prosthetist, for he must be more than a bridge worker; he must know when something different from a bridge is best suited to the case in hand, and he must be able to apply it—must use scientific methods plus a conscientious regard for the requirements of his patient.

What do we mean by scientific methods?

#### DETERMINING THE TYPE OF RESTORATION CALLED FOR.

When a patient presents for a prosthetic restoration a thorough examination of the mouth is made. This requires a thorough knowledge of the anatomy of the teeth and surrounding tissues, a thorough knowledge of his-

tology, pathology and physiology, for given equal manipulative skill the dentist who possesses the greatest knowledge of the associated or medical sciences underlying the practice of dentistry will be the most competent practitioner.

An examination for the replacement of lost teeth should be made first of all with the specific intent of ascertaining the physiologic status of each remaining tooth and, secondly, a suitable physiologic status of the mouth and teeth must be realized and maintained after the prosthetic piece is adjusted. As an aid to our examination the X-ray should be utilized to determine the condition of the apical and peridental tissues.

No effort should be spared to place the mouth in a hygienic condition. And when this condition has been realized impressions are taken of the upper and lower arches, and from these models are made and articulated. These are study models and are used for the purpose of studying the mechanical principles involved, the stability of the teeth which are to serve as abutments, the resistance to stress which can be borne by the different teeth and the effect of stress caused by leverage and force of occlusion in mastication. This is very necessary, as traumatism, as the result of faulty occlusion, is known to be the cause of many failures and the loss of the supporting teeth. Dr. F. B. Noyes, in a paper "The Mouth in a State of Health," read before First District Dental Society and published March 1918 in the *Journal of the Allied Dental Societies*, places occlusion in the first place of importance, and Dr. Paul R. Stillman, in a paper "The Human Mouth in a State of Health," read before the Second District Dental Society, October 1917, and published in *Dental Items of Interest*, August 1918, states that considering the various functions of the teeth, that of mastication is of first importance.

From our examination and study of the mouth and models a definite type of appliance is planned, one which will best suit the requirements of the individual case; and with this plan before

us, we proceed with the work and carry it to a successful conclusion.

The type of restoration in which we are most interested is that which allows of making a restoration without endangering the vitality of the pulps of the teeth which are to be used as abutments. This method of replacement is not new. If one will go back a few years he will find this subject well represented in dental literature. Evans' "Crown and Bridge Work," in the early editions describes many methods for avoiding the destruction of tooth structure and the devitalization of the pulp, also what was called detachable or removable bridge work, using the same ideas that we follow at the present time, *i.e.*, the tube and pin, the box attachment, etc.; even the parallelometer was used. The Bonwill type of clasp-plate bridge, the blade-and-groove bridge, all are represented, and were demonstrated and more or less successfully used thirty years ago.

Drs. Bing, Waters, Parr, Litch, Morey, Bonwill, and Alexander were the men leading in these methods, which were not dissimilar to those which we are following today.

Condit, Morgan and Griswold methods I am sure many of you will remember.

As early as 1871 Dr. Bing devised a method of replacing a lost tooth by fitting a projecting platinum bar to each side of an artificial tooth and embedding the ends in fillings in the adjoining natural teeth. This method did not attain any general degree of adoption, as the weakness of the constructed piece when exposed to the force of mastication resulted in too many failures.

#### THE INLAY AS A BRIDGE ATTACHMENT.

In 1896, Dr. C. L. Alexander presented a paper before the Southern Dental Association, describing a method of making restorations in carious teeth by means of the matrix inlay, fitted with pins, and also utilizing this as an abutment piece in small bridge construction. This method proved to be far more satisfactory than the Bing method and is

still utilized both in making restorations in carious teeth and in small bridge construction. With the advent of the cast inlay, the superiority of this method over other inlay methods of making restorations is so patent and convincing that the general present plan of procedure is along these lines. When a patient presents with several teeth missing, the remaining teeth on each side of the space unblemished, I construct a cast clasp type of restoration. If there are spaces on each side and the remaining teeth sound, I modify the type of restoration and use a lingual or palatal bar with cast clasps. This type of appliance can be utilized for anterior restorations and in many places where the remaining teeth are sound. But in carious teeth, or for some other reason, where this type of appliance is not suitable, we resort to the inlay type of restoration. It is in the use of the cast inlay as a means of making bridge restorations that we are here concerned and especially in connection with vital teeth as abutments.

It is possible to construct and properly anchor inlays to be used as abutments, such as will remain permanently without devitalization. It is not necessary to destroy the crown of the tooth by denuding it of its protective enamel nor do we encroach upon the gingival or periodontal tissues. As the inlay is the foundation upon which the success or failure of this method rests, it is essential that it be so constructed that its retention will be permanent. Therefore a proper understanding of inlay construction is necessary. This means a proper cavity formation, a proper wax pattern, investment, burning out or volatilization of the wax, casting and finishing.

#### CAVITY PREPARATION.

The cavity preparation for the reception of this form of restoration does not differ from that for the inlay filling, excepting that it is prepared with one, two or more pin holes or grooves to which are fitted pins or posts. This additional retention is necessary, as with-



out these the inlay will be loosened by the force of mastication. These pin holes or grooves are formed in that part of the cavity that will not be likely to endanger the pulp. The cavity must be of the compound type in form, and it should be so prepared that all margins are carried to a point on the occlusal surface where they will be kept clean. All fissures and pits must be cut out so that the finished margins end in smooth tooth surface and the gingival margin under the free margin of the gingivæ; in short, the margins of the finished inlay must lie in areas immune to caries. The cavity must be wide enough and deep enough that the finished inlay will receive all and be able to resist all stress, and that the gold in the inlay is of a sufficient thickness and hardness to resist the forces of mastication without distortion. The walls should be parallel. I prefer a flat floor, with a slightly beveled edge where it joins the axial wall. In the mesio-occluso-distal type of cavity the axial walls should slightly converge toward the occlusal surface. I bevel the margins all around the cavity to protect the enamel and I believe get a better fitting inlay. In preparing the cavity, stones should be used instead of burs where possible and the tooth kept continually flushed by a spray of warm water about 100 degrees. It is not necessary to cut the cavity dangerously deep to secure enough room for the female part of attachment, as the contour of the tooth on the side next the space may be exaggerated or built out so as to give plenty of room for it, or we may use an external attachment, that is, one that has both parts attached to the side of inlay.

We have numerous types of attachments. Some are so intricate that their application requires expert mechanical ability; others have been devised with the object of simplicity. Each one has its particular field of usefulness, but the type which is scientifically planned and which can be applied with the least manipulative skill is of course the one which is most to be desired.

#### MAKING THE INLAY BY THE INDIRECT-DIRECT METHOD.

Our next step is to obtain the inlay. I use both the direct and indirect-direct methods as the occasion requires. We all have our own special technique for doing these things, but the pattern for an inlay of this type is made a little differently. We will describe the indirect-direct method. The cavity is thoroughly washed out with a warm antiseptic solution so that no saliva remains in the cavity. In the pin holes we place pins, but if we use grooves they will not require any special equipment. An impression is taken of the tooth, and from this an amalgam model is made. The amalgam model when removed from the impression is thoroughly washed and the pins removed. The cavity is then given a coat of thin oil and the pins replaced. One of my reasons for preferring the indirect-direct method is that all the work and the wax is handled at the same temperature, namely, room temperature which diminishes the tendency of distortion. The wax pattern is made, but that portion in which will be embedded the female part of the attachment is cut out, the inlay pattern is removed from the model and tried in the tooth in the patient's mouth, where the final occluding is done and if necessary the margins are burnished. It is then removed, washed and dried in alcohol, invested and cast. This gives us a skeleton inlay. The gold used may be of the fineness used for ordinary inlays. I use about 23-k. gold or 2 to 3 per cent. platinum. These skeleton inlays are washed and boiled in acid and any imperfections removed. They are then fitted to the cavities and finished.

Next a bite is taken, then an impression of the teeth with the inlays in position and the occluding teeth. I use modeling compound for all my impressions and get the results I desire. The inlays are given a slight coating of wax and a model made, using artificial stone. The occluding model is made of plaster. These models are properly articulated



upon an anatomical articulator. The inlays are now removed from the model and boiled in an acid bath to thoroughly cleanse them, then replaced in their respective places. If we use any of the ready-made appliances with a parallelometer, the tubes or female parts of the attachments are placed in correct positions and paralleled, using, of course, the parallelometer, and secured with sticky wax and the inlay is built up around them. The inlays are again removed, invested and the added portion cast, using platinized gold, as a harder gold than that used for the skeleton portion of inlay is necessary. The inlays with attachments are removed and finished, replaced on the model and secured in their proper position and the attachments fitted in their relative sockets.

A piece of pure gold, 40-gage, is cut the proper size and carefully burnished on the model. The teeth are then selected. All-porcelain teeth are best adapted and they are properly ground to fit the saddle and grooved out on the sides enough to permit a sufficient thickness of gold to support the attachments, seeing that the teeth articulate properly. The teeth are then removed, coated with a thin layer of sandarac varnish and, when dry, oiled. A small piece of wax is pushed into the pin hole and a piece of pink base-plate wax is softened and placed on the gold saddle. The tooth with the wax in pin hole is forced into this and the articulator closed until the teeth are in their proper positions. The articulator is then opened and the piece finished in wax. When the teeth are removed the wax pin will be found adhering to the wax saddle. The piece is removed from the model and washed and dried with alcohol. The reason for drying with alcohol is that, when the wax piece or inlay is invested wet, the investment material immediately around it is made thinner by the absorption of water from the piece and when the investment is dried out this water is driven off leaving a porous surface. The piece is then mounted on a former. As many wax sprues as may be necessary can be used, terminating in a central one which leads

to the former. It is now painted or coated with the investment material, using a badger-hair brush to push and brush the material into all parts, and the investment completed in the flask.

Up to this point all the details have been accomplished at room temperature. I immediately place the investment in an oven at a temperature of 75° F., and keep at that point until the investment is hard, when I gradually increase the heat for five minutes. Then the temperatures run up to about 500 degrees for ten minutes. Larger pieces may be heated a little longer to thoroughly burn out the wax. Lately I have been heating up to 350 degrees for one hour to one hour and a half. This is supposed to leave a carbon coating on the investment giving a smoother surface. As yet I am not satisfied that the results are better than those secured by the first method. I cast in a warm mold with a steam pressure machine. In casting the saddle I use equal parts of coin and 22-k. gold. The casting must be allowed to cool before it is removed, when it is washed, given an acid bath, again thoroughly washed and cleansed and examined for any imperfections.

The sandarac varnish is removed from the teeth and they are fitted to their places on the saddle and the whole returned to position on the model. The attachments are fitted to their respective tubes or slots and adjusted to the sides of the saddle and secured with sticky wax. The teeth are removed and the saddle, with attachments waxed in position, removed from the model and carefully invested, heated and soldered, cooled, again given an acid bath, washed and finished. The piece is finally adjusted on the model with the teeth in position. It is then removed and with the inlays adjusted in the patient's mouth. The inlays are cemented in their respective teeth. The porcelain teeth are cemented in the saddle and the finished piece placed in position in the mouth.

Another method, and the one which I use most frequently, does not require a parallelometer. The method of procedure is similar to the one just de-

scribed up to the point where we fix our attachments on the articulated model. We have the skeleton inlays in position. These are fully contoured in wax as the finished inlay should be, then we proceed with our saddle and finish it as described. Then the male parts of the attachments are secured in position on the saddle with wax, paralleling them with our eye. This is invested and the attachments soldered to the saddle. This is then finished. Now we coat the attachments and the adjacent parts with oil, slightly heat them and gradually with an up-and-down movement force them into the wax inlays until the saddle is properly seated on the model. It is

then removed, leaving a socket in each wax inlay. The inlay is removed and the socket carefully filled with investment material and the investment and casting completed in the manner described. When the inlays are washed the sockets are carefully cleaned out and any imperfections removed and the attachments fitted to them. Then the procedure is the same as described in former methods; one end may be completed first and then the other, or both together as described. Clasps, both fitted and cast, each serve a definite purpose, and both are valuable aids in prosthetic restorations.

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## Observations Upon Trench Mouth.

By HARRISON L. PARKER, D.M.D., Winchester, Mass.

**A**CUTE ulcerous stomatitis, Vincent's angina, trench mouth, or "epidemic gingivitis," are all terms used to describe an infectious mouth and throat disease prevalent among the soldiers on the western front during the recent war.

The four types of the disease are clearly and concisely differentiated by A. R. Campbell and A. D. Dyas in the *Journal of the American Medical Association*, June 2, 1917.

In comparing cases it was observed that nearly always there was a co-existent aggravating agency to the disease. The spirochetes of Vincent's angina are found in normal mouths at times, and all factors conducive to the lowering of the vitality of the membranes of the mouth predispose to trench mouth.

The photographs (Figs. 3 and 4) show a portion of two mouths in which the disease is present and the resulting ulcerations along the gingival margins.

Types II and III are shown in the pictures, and are the most common of the four types referred to. It will be noted that the festoon at the interdental embrasures is destroyed, and this should be specially noted in diagnosing a mild or incipient case in civil practice. The other cardinal symptoms are: a very sore gum, which bleeds easily and annoys the patient, a grey pseudo-membrane, and an extremely foul heavy odor of the breath. The latter is so characteristic that if once recognized it will always be a positive means of diagnosis.

Figs. 1 and 2 are microscopical photographs of trench mouth smears taken from the gum in two very typical cases. They show the (a) fusiform bacilli and (b) masses of spirilla. The magnification is 604 diameters, showing the different kinds of bacteria and their relative numbers.

These are representative fields. A much higher magnification, while of



course showing the individual bacteria more clearly, would give too small a field to show the groupings well.

Fig. 3 shows the vestibule of a mouth in which an acute ulcerative stomatitis

due to ulceration and a grey necrotic membrane is present. The gum is much inflamed, sore, bleeds at the slightest touch, and the breath carries the characteristic odor of this disease.

FIG. 1.

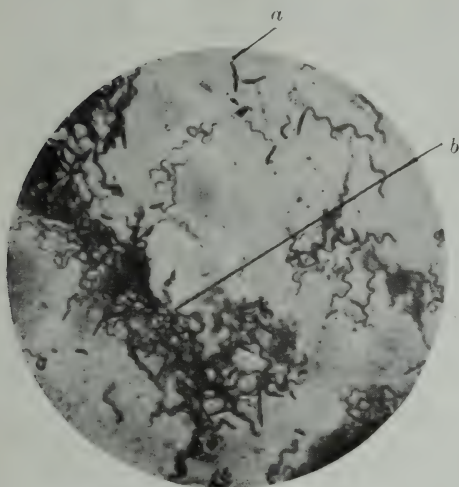
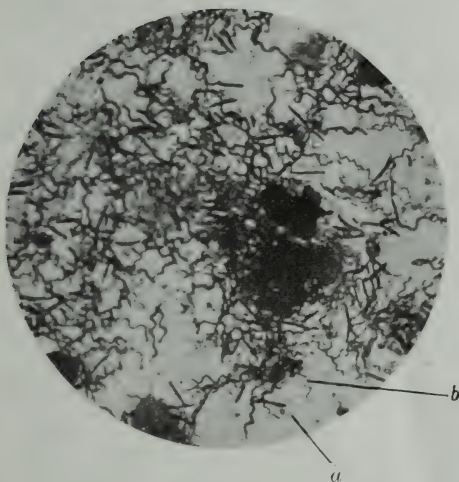


FIG. 2.



or Vincent's angina or trench mouth is present. In this case an impacted deciduous first molar gave evidence of being an aggravating cause. This was removed during the successful treatment of the case.

The gingivæ have lost their contour

FIG. 3.

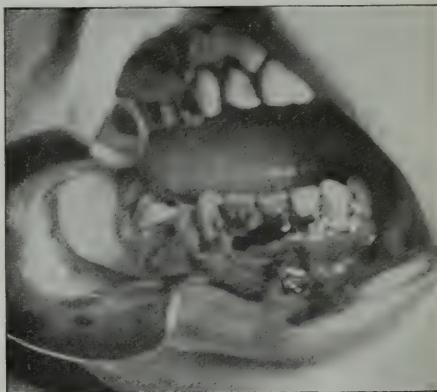
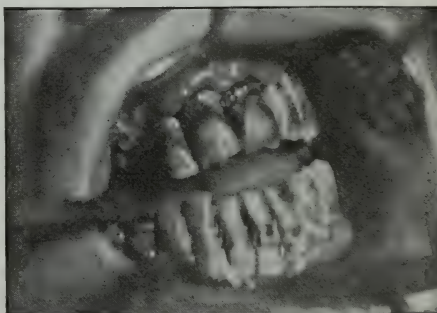


Fig. 4 shows much tartar present to aggravate the disease in this case.

The successful treatment depends upon the stamping out of the invading bacteria by the use of powerful oxidizing and disinfecting agents and con-

FIG. 4.



tinued prophylaxis to prevent recurrence.

Observations would show that these organisms, whether they are the same organism in different developmental stages or two distinct forms, are not the primary etiological factors, but are



secondary invaders of a necrotic focus, upon soil prepared for them by other microorganisms in individuals severely run down by acute disease or great hardship.

It is an infectious disease, spreading rapidly in the same mouth, yielding most satisfactorily in response to treatment during the first five days, but requiring prolonged care for several weeks or even months in exceptional cases for complete recovery of the tissues against recurrence.

#### PREDISPOSING CAUSES TO TRENCH MOUTH.

(1) Filthy water supply and unsanitary means available to troops.

(2) Depleted vitality from long recovery from surgical wounds.

(3) The habitually unsanitary mouth. Personal neglect, poorly adapted and unsanitary crowns and bridge work, defective fillings and malocclusion are aggravating agencies to this disease and invite a recurrence. Malposed teeth and impacted teeth retard successful treatment of the disease.

(4) Metallic poisoning. (A) The ulcerating processes of Vincent's angina were present in the mouths of six patients suffering from severe gunshot wounds in the treatment of which bismuth, iodoform and paraffin paste had been used. In these mouths, in addition to the Vincent's membrane, a pronounced area of discoloration of the buccal and labial mucosa and the lateral margins of the tongue was noted, caused by deposits of a dark-brown to black pigment where these surfaces lay against the teeth. The gums showed the same dark-brown line of discoloration (bismuth poisoning) paralleling the gingival margin. Vincent's ulcers on other parts of the mucous membrane also showed the line of pigment beyond their margins.

The treatment is the elimination from the wound of as much of the paste as possible. Ultimately the teeth are liable to be sacrificed if this complication is allowed to continue.

(B) Poisoning by the prolonged use of the drug mercury. This is a very common predisposing and coexisting agency to "epidemic gingivitis" among troops.

It has been a question whether in a majority of cases of so-called trench mouth the typical ulcers as seen were not primary lesions in themselves, and capable of producing the pallidum. This might be possible because a syphilitic can be reinfected, and if so he does not have a primary chancre, but a chancroid or soft sore, which in such cases is a syphilitic lesion. However, trench mouth is not a lesion of syphilis according to the best authority, though syphilitic patients are especially liable to it.

Many troops infected with trench mouth on being examined with the Wassermann test showed a slightly positive reaction. With the elimination of the ulcerative stomatitis or so-called trench mouth the Wassermann test was negative, and the case was then discharged as never having had syphilis. Such a case should not be sent to a special venereal hospital, although unfortunately his mouth condition is mistaken for a relapsing syphilis owing to a slightly positive Wassermann.

If any inflammation occurs in the mouth due to the general use of mercury, the Vincent's organisms are especially liable to locate upon this area and develop characteristic ulcers. Efforts to find *Spirochaeta pallida* upon these ulcerations are seldom successful, as it is very difficult to differentiate it from other spirochetes found in the mouth. It is doubtful if Vincent's spirochetes can give a double positive (+ +) Wassermann. A double positive Wassermann is practically a proof of syphilis. Where a case of trench mouth gives a double positive Wassermann, more than one test should be made.

In regard to asepsis in technique in the local treatment of trench mouth we took the same precautions we would use in handling mouths where the true specific lesions are present.

# Laboratory Training and Orthodontic Technique for the Undergraduate.

By ARTHUR L. MORSE, D.M.D., Boston, Mass.

(Read before the annual meeting of the Eastern Association of Graduates of the Angle School of Orthodontia, New York, May 3 and 4, 1920.)

IT seems to be the opinion of many men that orthodontia should have a place in the training of the undergraduate. What, then, is orthodontia technique good for in the education of a dentist? The word "education" seems to be as difficult to define as the word medicine or orthodontia. Although a great deal has been written on the subject, yet the definitions vary greatly. In a broad sense, education means training in mind, body and morals. Surely the dentist, no less than anybody else, needs training in all these. Tyler thinks the maxim of Socrates, "If a thing is good, it surely must be good for something," may, perhaps, furnish a standpoint from which we may wisely view our present systems, and seek to discover possible improvements. He thinks, that if a system of education be good it should "enable the man to avoid or cope with the dangers of life, and to seize its opportunities; in a word, to meet its emergencies successfully."

Since the prime object of a dental education is to train men in the science and art of dentistry, it follows then, from the above, that it must train them to meet successfully the emergencies encountered in dental practice. We believe the experience gained in performing the operations in orthodontic technique will help the dentist meet these emergencies, because these operations require finger skill for their execution; and the dental student needs finger training for his mental and physical development.

Although we are concerned primarily

with making dentists, we are not unmindful of the fact that, as has been said recently in the DENTAL COSMOS, "the evolution of dentistry as well as of medicine follows the general biologic law of development, from the simple and homogeneous to the complex and heterogeneous." This complexity has led to the establishment of certain well-defined specialties, among which is orthodontia. Hence, we have a secondary object in dental education, which is to promote interest in the special branches. These branches are entirely dependent upon recruits trained in the science of dentistry. It is a short step from a good dentist to a specialist.

Inasmuch as the first object of a dental education is to train dentists to meet successfully the emergencies encountered in their profession, they must have a knowledge of all the branches of the science regardless of whether or not they are going to specialize. Therefore orthodontic technique finds its place in the dental curriculum. We do not expect to make a specialist of the undergraduate. We would teach only those essentials which are fundamental to orthodontia and to dentistry.

By the performance of the tasks in orthodontic technique, it is not to be supposed that we would make the student proficient in the mechanics of this branch of dentistry. Even if it were desirable, there is not time enough. The growth and establishment of a distinct speciality of dental mechanics indicates that the dentist prefers to allow these



specialists to do their mechanical work for them. Without doubt this is well, for a better mechanical product is thus obtained than the dentist would be able to bring forth; and more time is gained for the pursuit of dentistry as part of the healing art.

Since orthodontic technique is taught not to make finished mechanics, but for the physical and mental development of the student, it is necessary for us to understand how this is possible. A study of phylogeny gives us a possible clue. It is a law of evolution that the development of the individual is a brief repetition of the development of the race. In this development the growth of the muscular system has called for the growth of a nervous system to actuate the muscles. Tyler in "Growth and Education" puts it thus: "Every added muscle fiber absolutely required a corresponding addition to the nervous system, which accordingly steadily increased in size and complexity." "The development of the muscular system carried with it, or dragged after it, the development of our most important viscera—and of the brain itself." The brain and the hand progressed rapidly during that period in which the ancestors of man took to living in trees. Hall says, in "Adolescence:" "Arboreal life seems to have almost created the simian hand and to have wrought a revolution in the form and use of the forearm and its accessory organs, the fingers. Apes and other tree-climbing creatures must not only adjust their prehensile organ to a wide variety of distances and sizes of branches, but must use the hands more or less freely for picking, transporting and eating fruit, and this has probably been a prime factor in lifting man to the erect position, without which human intelligence as we understand it could hardly have been possible." In another place he says: "Muscles are in a most intimate and peculiar sense the organs of the will. They have built all the roads, cities, and machines in the world, written all the books, spoken all the words, and in fact done everything that man has accomplished with matter. If they are

undeveloped or grow relaxed and flabby, the dreadful chasm between good intentions and their execution is liable to appear and widen."

The development of the muscular system follows the general law, from the simple to the complex. First, the fundamental muscles are developed; these control the grosser movements of the body, of the trunk, shoulder and thigh—then the accessory muscles are developed; these are the ones with which we talk, write, fill teeth and do orthodontic operations. We are concerned with the education of these latter muscles. Education in general is concerned with their development and training. If we would do the best by the student we must not neglect their training.

It is the business of the teacher to know the period of development his students are in, so that he may apply the proper kind of muscular exercise best suited to their mental development. These students are in the latter part of that period which Hall calls "the golden period for acquiring the skill that comes by practice." It is during adolescence and early manhood that there is a marked increase in the growth of certain fibers of the association areas of the brain. In Hall's words, "The development of these fibers seems to follow, more closely than any other brain structure we know, the growth of intelligence." Tyler says, "Their origin (of the association areas) was stimulated by the development of the arms and more especially the hands with the sense organs." It follows then that the training of the hand means the education of the mind. These students are in the period when the exercise furnished by the operations of orthodontic technique will be of great benefit to them. These operations require finger skill for their execution. The dentist needs finger skill. The nature of his work demands it.

The training the student gets in orthodontic technique bears the same relation to general dental training that manual training bears to general education. The educational value of manual training is now universally admitted by



educators. In a sense the laboratory method of instruction is manual training, for the student uses his hands to perform experiments or construct the things about which he has read. The study from books is not enough. The student must go to the laboratory and do the things himself. It is in the laboratory that the ideas he has gathered from books and lectures become crystallized in his mind by actions. Ask any student and he will tell you that he has never really understood what he has read, or been told, until he has been able to do the thing himself. Your own experience will undoubtedly confirm this fact. Tyler says, "When the eye, hand, and brain all work together upon a problem, the result of the combined study is far more than three times as great as if any one of them works alone. We never have really seen an object until we have attempted to draw it; much less do we understand a process we have never attempted to perform." The laboratory method is now used, and has been used for some time, in other branches of science, in other departments of medicine and of dentistry.

Although we do not expect to make the student a finished mechanic, we should expect that he produce an article, finished in a workmanlike manner. Anything that does not come up to a certain standard of perfection, should be made over and over until it does come up to requirements. If slipshod work is allowed, the value of the training is lost, because it is in doing these tasks well, that the student gains an appreciation of good mechanical work. Tyler observes that: "Accuracy of thought and expression is secured through accuracy of observation required for precise action." It will strengthen his moral fiber to take pains and to use patience to do his work. What better training can he have for his own special work? If he is obliged to do all his work carefully and accurately, he will get the habit. We are creatures of habit.

In order to train the undergraduates in the manner indicated above, we would instruct them in the manipulation of

plaster of Paris and manipulation of metals.

We would have him instructed in the use of plaster as the orthodontist uses plaster, because from past experience with undergraduates and graduates we are led to believe that many of them do not acquire the knack of the use of this valuable material until they have been in practice a good many years. Some never do. We will agree that dental students should know by the end of the second year, when this course begins, how to use plaster. Whether they do or not, added instruction at this time will not be out of place, for as has been said: "One gets the best results from practicing the act he wants eventually to perform, and in the way he wants to perform it."

Therefore the first exercise we would have the students do in this course would be to make two plaster blocks representing the top and base of a set of models. (This idea was obtained from a laboratory manual prepared by Dr. Lischer.) This will give the student an opportunity to apply the instruction given in the use of plaster, and introduce him to the art of trimming the art portions of models. The work must be done accurately to specified dimensions.

The student should then be instructed in taking plaster impressions and making models from them as the orthodontist performs these tasks, because the technique is different from that ordinarily used by the general practitioner and is used under different conditions. This technique is one that has borne the test of time and has proven satisfactory; and the dentist as well as the orthodontist has use for this kind of an impression and this kind of a model. Such models are necessary to study the requirements of badly mutilated cases. An accurate model is necessary for one who would restore the efficiency of the masticatory apparatus, whether it be by the means of crowns, bridges, fillings or plates.

Next, we would teach the student the manipulation of materials as the ortho-

dontist manipulates them in the construction of molar bands by the technique published by Dr. A. P. Rogers.

This technique includes all the steps ordinarily used in making bands, and can be used in general practice. It necessitates, as you know, taking a plaster impression, carving a modeling compound model of the tooth to be banded, the manipulation of fusible metal, and working with sheet metal. All these steps give the student an appreciation of the typical tooth forms, and develop accuracy of work.

We would also teach the fabrication of some of the simpler forms of orthodontic appliances, such as the plain labial arch, or possibly the lingual arch. We would do this in order that he may become not only acquainted with these appliances but also with wire bending, because the dentist uses wire bending in practice.

Lastly, we would instruct in free hand soldering by making geometric figures or small articles representing furniture. This is for the purpose of developing the power of coördination, which is so necessary in the ordinary daily routine duties of the dentist, and without which he is like a ship without a rudder.

By doing these exercises or similar ones in orthodontic technique the undergraduate becomes acquainted not only with the materials we have spoken of and their manipulation, but also gains an appreciation of the typical forms of the

teeth as they stand in neighborly and occlusal relations in the unmutilated dental arch. Orthodontic technique, in this respect, is unique. No other technique presents these phenomena so well. A knowledge of these relations is necessary to the dentist in the discharge of his duty to his patient.

In conclusion we would say:

We believe the undergraduate should have the training in orthodontic technique, because it requires manual skill to produce creditable results. Finger training is essential to the student because he is in the period of development when finger training means physical and mental development. To deny this is to contradict the fact of evolution. Orthodontic technique will help the student meet the emergencies encountered in practice, because it will develop skill. It will help produce dentists grounded in the fundamentals, because it is one of the fundamentals. We realize that he cannot be proficient in all branches of his chosen profession, so we should strive to interest him in our branch. The number of men in a dental specialty is limited by, and dependent upon, the number of men trained in the fundamentals of dental science.

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520 BEACON ST.

## Plumpers for Artificial Dentures.

By FREDERIC H. BROWN, D.D.S., Lebanon, N. H.

**F**ACIAL restoration approaching natural expression in all edentulous mouths can be accomplished. This unlimited field for artistic and remunerative work is practically unexplored. The appreciation and gratitude for real esthetic restoration is most pleasing and

enough wax to distend the cheeks and lips beyond all needs, remove and trim off all unnecessary wax, chill the impression, and then cut out all the surface except about one-eighth of an inch around the outer periphery, to the depth of three-sixteenths of an inch. Take

FIG. 1.



creditable to the prosthetist. Perhaps the difficulty in writing on this subject is that no technique or rules can be given; each case requires the artist's eye in working out the problem. There are a few fundamentals which should be followed. If the case comes for extracting, take an impression with modeling compound and set aside. After the patient is gone, having saved the teeth, drop them in place, run the model and file for reference.

If the case is one of great absorption as illustrated (Fig. 1), select an impression cup two or three sizes larger than for the ordinary impression. Take an impression with beeswax, heat the cup so that the wax will stick to it, using

impression as usual by this method and when the plaster is set do some muscle trimming that is not described in the books. Examine the mouth and with a pencil mark around the inside of the impression about one-eighth of an inch higher than the muscle attachment shown when the cheek and lip are drawn away, as a plate can ride the muscles to a small extent; beginning at this line cut away all signs of muscle, rounding up to nothing on the outside of the impression. Now run the model. You have an approximate form on which to block out the plumpers—this is of course a part of the bite. Next seat the patient comfortably, also yourself, as you may consume an hour in the building up and



trimming down of the plumpers. Give the patient a hand mirror, which not only interests, but makes him a "party before and after the fact." There is no limit to the amount of needed extension that can be worn with comfort, and often is a factor in the retention of the plate. When results are pleasing and all is ready for the articulator, cut away the model all around up to near the muscle line, then seal with wax, set up, and invest in a large flask, leaving as much of the plate in the lower half of the flask as permissible and leave room for the pink gum rubber in the upper half. When ready to pack, have the flask hot, and rubber in a shallow dish of boiling water. Having put two sheets of rubber together making a double thickness, lay in the lower half, which is the bulk of the plumper, a strip wide enough to cover what will be the top of the plumper; then lay in a suitable piece of aluminum shaped to conform to curves, laying it close to the model that it may not be exposed in finishing.

The main excuse for this little dissertation is to advocate the use of aluminum as a metallic core in the vulcanization of a large bulk of rubber, because of its good conductivity. A perfectly solid rubber is obtained. Pieces of vulcanite as commonly used do not always accomplish this, and are unsightly when exposed in the finished plate. Porosity in large plumpers has undoubtedly been a deterrent in doing restoration work.

Another advantage. Aluminum lightens the plate and reduces the shrinkage

of rubber, which according to Dr. George B. Snow is five per cent. in red rubber and three per cent. in pink.

The case illustrated has two bows of three-sixteenths inch aluminum wire as shown on the model (Fig. 1). The thickness on the sides is one-half inch; from the canine eminence to tip of canine tooth, one and five-eighths inches. The cheeks were flat and corners of the mouth drooping. The arch of the plate of course is very high but causes no complaint, although the wearer is a public speaker. Had it proved a handicap a hollow plate could have been made as illustrated in the DENTAL COSMOS some years ago by the writer,\* thus bringing the palatine surface as low as desirable. In doing restoration work bear in mind that the muscles and soft tissues will play over a rounded, highly polished surface without irritation, just as a belt will play over a pulley, but not over a knife edge. In passing I might add that I made a lower set about a year ago for this same gentleman and correspondingly large, but had not thought of aluminum, so two vulcanizations were made.

To encourage work along these lines I might state that the fee for the illustrated case was three times that of an ordinary set of teeth, and we quote a line from the letter accompanying check: "Thanks for all your kindness and skill money will not buy."

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\* See DENTAL COSMOS for August 1909, Vol li, page 1018.

## Nigrities Linguae, or Black Tongue.

### A Case Report.

By RAYMONDE A. ALBRAY, D.D.S., Newark, N. J.

**P**ATIENT, Mr. P., about thirty-five, presented for treatment of sore and tender gums, and to learn the cause of a peculiar condition which he had noted on his tongue.

Irritation from salivary calculus evidently was the cause of the gingivitis, for removal of the tartar resulted in the prompt restoration of the gums to a healthy state.

Across the dorsum of the tongue well to the base and extending about halfway forward in the median line was a pyramidal dark brown and black discoloration, with elongation of the papillae. No pain was associated with the lesion, although the tongue was slightly swollen and the under surface showed dark brown pigmentation in groups of very small spots.

A diagnosis of nigrities linguae or black tongue was made, and the area involved painted with a ten per cent. solution of copper sulfate in distilled water.

The patient was next seen two days later, at which time nearly the entire dorsum of the tongue was covered with the dark brown or black fur, still maintaining the pyramidal form with the tip of the pyramid to the tip of the tongue. The patient described its appearance as resembling a whole forest of Christmas trees. The longest of these elongated papillae were five millimeters, and they could be removed, by grasping them firmly with a pair of tweezers, with little difficulty and no pain.

Nothing in the history obtained seemed in any way to account for the condition.

The patient's attention was first attracted to it by the slight swelling and stiffening of the tongue. At first the affected papillae were brown in color and gradually became a dull black. There was the same disagreeable odor to the breath that accompanies stomatitis.

The literature on the disease is very meager; Brown in "Oral Diseases and Malformations" cites a case of Kirk's and refers to it as "a hypertrophy of the papillae of the tongue with pigmentation." Blair in "Surgery and Diseases of the Mouth and Jaws" speaks of it as a form of keratosis. Kyle in "Diseases of the Nose and Throat" refers to the condition, and classes it as epidemic erysipelatos fever.

I had treated two cases several years ago with copper sulfate solution with satisfaction, so prescribed a five per cent. aqueous solution, applied to the tongue twice daily in this case. Smoking and the use of condiments or highly seasoned foods were prohibited, and the patient instructed to keep the bowels acting freely. The patient was a traveling man and had to leave on a business trip, so I did not see the case again for three weeks, at which time the tongue had practically cleared.

Smears, cultures, and a number of the papillae were taken for examination, but through one of those unfortunate happenings which sometimes occur in connection with unusual cases, the whole collection was lost, and as the patient had left on his trip others could not be secured.

340 BELMONT AVE.

## The Future of Oral Restoration and Oral Restoration of the Future.

By JAS. KENDALL BURGESS, D.D.S., New York, N. Y.

THE discussion of any future condition or relation implies contrast with the present. In order, therefore, that we may make an intelligent prophecy in the matter which I bring to you it seems expedient that we should discuss the present status of oral restoration and of its products. What are its virtues and what its vices as these matters concern the patient and the operator? What are the ideals being sought by its producers and how do these ideals comply with the fundamental requirements of the organism? What are its vital factors and what are some of the fads and fancies with which it is burdened? What is the relation between its cost and its value? These are matters of vital concern to both patient and operator, but more especially to the patient because it is the patient who pays in money, time, pain, nerves, apprehension and sometimes health and even life itself.

For the purpose of study the products of oral restorations may be divided into two general classes, fixed and removable, and since the removable bridge advocates, strangely enough and inconsistently and for reasons unknown to me, have not yet adopted the removable inlay nor, so far as I know, even the removable individual crown, and since the fixed bridge adherents, with all the sins of omission and of commission that have been attributed to them and often justly, have not been accused of cementing full dentures to place in the mouth, it will not be needful to include these extremes of oral restoration in our consideration. There is another classification which recent events have forced upon me as being

necessary to a thorough understanding of the subject. I had supposed that the term "bridge" was well and uniformly understood, but have been brought to believe that in the minds of some any type of partial denture is a bridge. For the purpose of this discussion therefore we shall divide partial restorations into two classes according to their means of support. Those depending upon the deep structure of the jaw, *i.e.*, the natural tooth or teeth with their root anchorages in the alveoli, for support and resistance to stress of mastication, we shall call bridges. Those dentures with their bases resting upon the superficial mucous tissues and depending upon such rest for support and resistance to the stress of mastication we shall call by their rightful names of saddle dentures. They are not bridges, by whatever means they may be steadied in their positions. To cement such an apparatus into position in the oral cavity would be criminal; to cement to position any appliance with such saddle-shaped base however supported is mal-practice and, because some practitioners, ignorant or careless of the consequence of such procedure may do so, to place all workers in restoration who advocate fixed bridge work in the same category and the same condemnation as some seem prone to do is ignorant or slanderous according to the state of mentality of the accuser.

I have encountered, too, a very general misunderstanding of the term of "saddle," many dentists giving that name to any construction that approximates the gum tissue over an area larger than a mere point or broader than a single



edge. The use of the word as it applies to oral restorations evidently comes from its similarity in conformation and its relation to the ridge to the saddle used by the rider of the horse or other beast of burden, by means of which the rider is seated and through which his weight is transferred to the animal that bears him. A cervical surface of a dummy tooth in a true bridge, which approximates in area a cross section of that part of the natural tooth which it supplies and bears the relation of proximity to the tissues but does not gain its support from them, is not in any sense a saddle but merely a cervical surface. Dr. C. E. Bentley of Chicago, in a descriptive article in the April *Dental Items of Interest*, falls into this error and I find by reference to an earlier paper that I have made the same mistake. But I take this opportunity of correcting it and of calling attention to the fact that saddles and cervical surfaces of bridge dummies are supported by different means, bear different relations to the tissues, perform different functions, and should not be confused in our nomenclature.

With this explanation then let us proceed to an analysis of our subject. We have restorations divided into two general classes: fixed and removable. We have removable restorations divided into two classes: bridge work and saddle dentures. We have saddle dentures with terminal anchorage and lateral anchorage and we have these with terminal anchorages divided into uni-terminal and bi-terminal anchorages.

#### RELATIVE MERITS OF FIXED AND REMOVABLE BRIDGE WORK.

Since, in many cases, conditions and relations in the oral cavity leave no choice but the use of the removable denture it seems expedient to consider first those cases in which there is an opportunity for the exercise of judgment or preference. This will bring us to a discussion of the relative merits of fixed and removable bridge work—the extremes of simplicity and complications in denture construction—after which we

shall compare each of these with various types of saddle restorations.

In a recent paper, entitled "Some Comparisons of Cost and Acquirement as They Relate to Fixed and Removable Bridge Work and Some Arguments Answered," read before the King's County Dental Society of New York, I discussed this particular aspect of my present subject from various points of view and I shall take the liberty of drawing freely by quotation and paraphrase upon the matter contained in that essay.

In determining upon a course of action in a given case many things must be taken into consideration. The very basis and justification for the existence of this or of any profession is the service it renders, and the recipient of the service therefore must be always the chief object of our consideration. Justice to the patient demands that our productions and our efforts in his behalf shall be of such nature and value as to compensate for its cost. As between the recognized systems of removable bridge work and that type of fixed bridge work which most nearly conforms to Nature and her requirements in conservation, conformation, relations and functions, what are some of the items on the debit and credit sides?

Removable bridge work of anything like general application is of such construction as to require certain parts which remain permanently fixed to the teeth, being fastened either externally, internally or occupying a combination of these relations. This combination of tooth and fixture constitutes the abutment to which must be attached by external, internal or a combination of these means some corresponding apparatus for the purpose of obtaining and maintaining an adequate security of anchorage for the restoration. This whole combination of fixture and detachable part or parts must be of such size and conformation as to come within the compass of the natural tooth or reasonably near to it, while at the same time each of the parts individually, whether fixed or detachable must be of substantial thickness

and bulk and must occupy a corresponding amount of space.

It is clearly to be seen then that if we consider the sum of the spaces necessary for each and all of these parts in its relation to the total bulk of the tooth, by the time sufficient tissue has been sacrificed for their placement the tooth will be but a wreck of its former self—pulp gone, enamel gone, in some cases the entire crown gone, the roots reamed to a shadow and Nature's beautiful handiwork but a dream and a memory to be replaced with cunningly devised barbarities of the manufacturing jeweler.

In considering the relative cost to the patient there must be charged against removable bridge work the following items:

Greatly multiplied pulp removals in the field of operation—practically universal in some systems—and greatly increased destruction of the hard tissues of the teeth extended frequently to include the entire crown of the tooth;

Largely increased expenditure of time for this multiplication of exacting detail;

Anxiety or even mental distress to many patients due to natural revulsion to dismemberment and fear of the consequences physically and esthetically;

Corresponding expenditure of nervous energy consequent upon apprehension as well as upon physical pain and discomfort;

Increased financial outlay;

The risk always and in some cases the materialization of periapical and systemic infection through the destruction of pulp in teeth used as abutments;

Hazard and sometimes the realization of puncture of roots with consequent lessening of their usefulness or even their loss through excessive enlargement for the placement of retentive devices;

The peril and often the actuality of fracture and loss of abutments as the ultimate result of the same procedure;

The danger, often fulfilled, of discoloration and consequent loss of esthetic harmony from the same cause;

Annoyance at the necessity of constant removal for cleaning and in many

cases acute embarrassment at the perpetual reminder of physical impairment.

Notwithstanding this exorbitant difference in the cost to the patient, when we come to compare the relative values to the patient of these restorations it will be found, as we shall show in discussing the matter from the scientific aspect, that there is no service or function of bridge work, active, prophylactic or esthetic, performed by the removable bridge that is not performed equally as well or better by the fixed bridge; so that the removable bridge has no advantage to offer in the character, quality or longevity of its service to compensate for its disadvantages.

It seems to me a misguided policy to condemn fixed bridge work promiscuously because some, even much, of it is poorly planned and made, in favor of removable bridge work when removable bridge advocates are continually at loggerheads among themselves, the father and followers of each system casting anathemas at the progenitors and promulgators of each other's systems for what each claims to be the failure of the other's efforts and the shortcomings of their systems. Since all engaged in the general work of restoration must of necessity do removable denture work, the essayist being no exception, I protest that as strong as is my aversion to this unnatural procedure, the fact of its being removable is my smallest objection, but the violent perversions of Nature, the destruction of her organs and tissues and functions in the name of restoration are revolting to humane instincts, let alone the finer sensibilities. What a grim and hollow mockery to murder and mutilate and then bedeck the carcass with the exquisite trappings of the jeweler's art! As the children of Israel turned aside from the way which God had planned and made the molten calf and worshipped it and sacrificed unto it and said, "These be thy gods, O Israel, which have brought thee up out of the land of Egypt," so these modern worshippers at the shrine of the material, reversing the order, first sacrifice the pulp and the tooth crown to the false gods



of the fascinations of mechanical execution and then build golden images with slip-joint attachments upon the wreckage and say, "These be thy gods, O Man, which shall deliver thee from every ill that flesh is heir to." Every such undertaking is a groveling in the materialistic and mechanical catacombs by those blind to the vision and deaf to the call of the great moral and spiritual appeal of a lofty vocation, a monument to stupidity that reeks with the spirit of the legend, "Here lie reason and judgment and common sense."

#### THE OPERATOR'S POINT OF VIEW.

This brings us to a discussion of the operator's point of view which must be that of outlay and achievement. Just as the financial may be the smallest item in the patient's expense account, so the money cost of his productions may be the least significant item to the operator. Some of the larger items are beyond the reach of money. I have used the term "outlay" to include and describe everything the operator puts into the securing of his results.

Let us analyze in some detail this cost of production. The complicated parts and devices, described in an earlier paragraph as being necessary generally accepted types and systems of removable bridge work and the surgical care of the teeth and pulp canals necessitated by their use, demand:

A degree of skill not possessed and incapable of development by many operators and expensive in time, money and effort for its development by those whose innate ability make it possible;

The care of infinite, complicated and exacting details not only for their production but for their adjustment and correlation requiring an excessive amount of time and a corresponding expenditure of physical and nervous energy;

Delicate, complicated and expensive instruments and apparatus and sometimes manufactured parts;

The necessity in many cases of accepting fees disproportionate to all this outlay in time, skill, energy and money;

Increased risk of failure complete or partial both as regards the physical and esthetic value of the abutment teeth and the attendant ill will of the patient and loss of prestige.

To make all of this worth while or justifiable the value of the results obviously must be commensurate with the expenditure on the part of both patient and operator, and as the results must be measured by the comparative benefit to the patient of the two methods under immediate consideration it will be necessary to study briefly the functions of restorations and make our comparisons in the light of these findings. This will bring us to a consideration of our subject from the scientific point of view.

Every restorative operation to fulfil its complete mission, mechanical, prophylactic and esthetic, must comprise good surgery, good engineering, good art and good workmanship. Aside from the surgical procedure necessary to eradicate morbid conditions and to place the field of operation in a physiological condition as a preliminary to any kind of restoration, perhaps the most important function of surgery is prophylaxis, and prophylaxis worth the paper it takes to write the word on must conserve and protect against destruction through operative violence as well as through degenerative processes.

Dr. Frederic A. Peeso in his book "Crown and Bridge-work for Student and Practitioner," 1916, says: "It is generally recognized at the present day that the pulp is purely a formation organ and after it has performed its function it is no longer necessary to the life and health of the tooth, and a tooth from which the pulp has been removed and the canal properly filled will do the work as a support for a bridge as well or even better than one in which it has been retained." Dr. Chas. F. Ash in "Removable Bridge Work or Non-Vital Abutments" published in *Oral Health* for January 1916, says: "Let us assume for the sake of argument that no septic conditions will ever occur at the apex of a devitalized tooth and that a dead tooth is just as good as a live one." Was



ever such tragic abandonment of everything vitalizing and spiritualizing to the purely mechanical functions and relations of the teeth! The removal of pulp and tooth tissue for the accommodation of removable bridge parts and devices not only belies the conservative phase of prophylaxis but renders the tissues not destroyed by this mutilating procedure more vulnerable and more susceptible to degenerative influences, and through the periapical connecting link between these tissues and the vascular system places every organ and tissue dependent upon the vascular supply in jeopardy through its contamination.

Compare with this pulp and tissue waste, this disturbance of function and risk to the organism, the simple surgical procedure necessary for the preparation of abutment teeth for modern fixed bridge work where tissue removal is scarcely as extensive or as deep as that for ordinary cavity preparation and it is plainly evident that the advantage surgically is entirely on the side of fixed bridge work.

It is no less true when we consider the matter as an engineering problem. The mechanical function of mastication is a matter of engineering, and so far as it depends upon the establishment of occlusal relations, there is no reason why any advantage should lie with either type. But the constant removal of the detachable part of removable bridge work necessitates a grasp of such increased tenacity of the fixed parts to the abutment teeth to guard against dislodgment as is not generally secured, or to be secured in teeth anterior to the molars except by anchorage into the root canals; thus transforming a pillar or column effect of the entire tooth with its ability to bear external stress without injury into a tube of greatly lessened capacity to stand the strain which now becomes an interior one. And not only so, but the anchoring attachments are of such complications and consequently of such size as to require an amount of space which can only be gained by the removal of so much and of such a proportion of the interior tissues of the root as that the

amount and the proportion remaining about this enlarged tubular interior is left so thin as to be greatly weakened and its liability to fracture and consequent loss correspondingly increased. Such a procedure, by tearing down and weakening the foundation and undermining the superstructure, violates the most elementary principles of engineering which should maintain the integrity of the foundation in the greatest possible degree and take every advantage of its inherent strength.

As an artistic undertaking, where the method of construction necessitates the removal of the natural crown and the use of an artificial substitute, the patient, in frequent instances, is subjected to a distinct loss in cosmetic harmony and excellence and the discoloration of the natural tooth following pulp removal is to many patients an esthetic calamity. Comparison of the almost universal destruction of the pulp in teeth used as abutments for removable bridge work with its infrequency in modern fixed bridge prosthesis will show the fixed bridge to have the advantage where art is concerned, not only in measure as these blemishes occur but in the proportion in which the patient is subjected to the risk of their occurrence.

The fourth comparison on the basis of fundamental requirements brings us to a consideration of workmanship. With all their fundamental importance, surgery, engineering and art must wait upon the technical ability of the workman to put their requirements into execution.

Dr. Stillman in his discussion of a former paper expresses the opinion that it takes a better workman to construct an ideal removable bridge, which is correct in every detail, than is required to construct the fixed bridge, and as a corollary he ventures that any good removable bridge worker can excel the fixed bridge worker in the making of a fixed bridge.

There is no such thing as an ideal removable bridge and none correct in every detail; but accepting what I know Dr. Stillman to mean rather than his actual

expression I agree with his assertion and use it as another argument in favor of the well-constructed fixed bridge.

The technical details and requirements of removable bridge construction are so numerous and so exacting and its difficulties so many and so great that a proportionately smaller number of men are capable of mastering them, whereas those of fixed-bridge construction are so elemental in comparison that any man capable of practicing dentistry at all should be able to overcome them. The method or system whose technical requirements bring it within the capabilities of the largest possible number of would-be producers certainly is advantageous in the degree in which its simplicity makes accurate production possible. So here again we must look to the modern fixed bridge for a way out of the mechanical intricacies and difficulties into which the mistaken ideals of the removable bridge enthusiasts have led us. The fixed bridge is made of the same materials as is the removable bridge, is susceptible and worthy of the same degree of care and attention to the details of construction, and the finished product is of as high degree of excellence from every point of view.

#### HYGIENIC BRIDGE WORK.

Under this head must be considered also hygienic prophylaxis because the details of construction that make for or against this important feature are in the hands and under the responsibility of the workman. It is refreshing to read in the published articles and books of the removable bridge propagandists that one of the chief advantages of removable bridge work over fixed bridge work is the fact that it can be taken out of the mouth and boiled. Dr. Peeso in his "Crown and Bridge-work for Students and Practitioners," 1916, so amiably and so convincingly says, "A removable piece can be taken from the mouth and thoroughly cleansed and sterilized by boiling or any other method which the patient may desire." That statement certainly very clearly expresses the possibilities,

but what can be done and what is done are frequently very different matters.

If an object allowed to remain in the oral cavity will collect matter which is or becomes unsanitary, and if this unsanitary condition is inimical to the patient's welfare, it requires but elementary reasoning to determine that the greater the extent of surface exposed in the oral cavity the greater will be the amount of accumulation and the element of danger correspondingly increased. I am loath to believe that patients who come under my care are different in any essential particular from those who patronize my fellow practitioners.

During a long experience I have seen enough to convince me that patients, with rare exceptions, are extremely careless about the condition in which they keep any type of restoration that can be taken out and handled and replaced, and that the most serious attempts at sanitary hygiene are in mouths where teeth remain as Nature intended they should and where the patient, realizing that they must be cleansed in the mouth if at all, will put forth the effort to do it. "Familiarity breeds contempt."

Patients almost invariably grow careless of artificial parts and slovenly in their care. It is a matter of frequent observation that a patient will remove his denture to facilitate operation in the oral cavity and at its completion replace the denture without cleansing or even rinsing it if allowed to do so. Oral sanitation is a personal equation but oral surgical prophylaxis or conservation is a professional duty and obligation. I have no sympathy with the maudlin demand for a degree of oral cleanliness, amounting to sterilization, beyond Nature's plans and requirements, and with all the straining after it beyond possibility of attainment while in the effort to achieve it Nature's plans and purposes are thrown to the winds in the sacrifice of her tooth pulps and crowns and the uncovering of her blood stream to the danger of contamination; this straining at a gnat and swallowing a camel that finds expression in the sentiment: To hades



with the reservoir and the conduits, protect the sewers!

To say that a tooth from which the pulp has been removed is as good as it was with its pulp normal is worse than "rot", it is a sacrilege. Oddly enough our super-sanitary friends have never told us how to boil our removable bridge abutments or the natural teeth that remain in the mouth. It can scarcely be denied that they require and deserve all the care that the detachable parts receive and some way ought to be devised to attend to so important a matter.

While awaiting the development and unfolding of these important plans, however, we are still dependent upon the mechanical means already familiar for maintaining as high a degree as possible of oral cleanliness. A superficial analysis will reveal the fact that the natural tooth presents five surfaces for this sanitary care.

The fixed bridge of modern construction where the dummy teeth are individualized presents three of these surfaces, the lingual, the buccal and the morsal of the same conformation, in the same alignment and bearing the same relation to the cleansing apparatus. Its mesial and distal surfaces being united over a part of their areas present reduced surfaces minus any contact points for cleansing. Its only addition to the five surfaces of the natural teeth is the gingival surface, reduced in area, approximating the gum but not bearing upon it, admitting no large particles of food debris but allowing the free passage of floss silk and rinsing fluids and as amenable to sanitary care in the mouth as it would be over the basin.

Dr. Stillman in a recent discussion said: "The fixed bridge which is constructed upon the principles which the essayist has laid down may also be kept sufficiently clean to be unobjectionable to a periodontist." To those who know Dr. Stillman, his ideas, his ideals, his ability and his standing among his *confrères*, this should be sufficient vindication of this feature of the fixed bridge and an adequate reply to the quibbling of those who have urged insanitation as

the condemning feature of fixed bridge work.

Thus a careful consideration of every phase of the scientific requirements of oral restoration fails to reveal any point of superiority of the removable bridge over the modern fixed bridge to compensate for its obvious sacrifices, perils and difficulties.

#### ECONOMIC PHASE OF ORAL RESTORATION.

Let us study briefly now the economic phase of the situation. The facts established concerning the various items of cost to patient and producer in our consideration of the patient's point of view and the producer's point of view bear directly on the economic question as it affects these two individuals as parties to the transaction. It is to be assumed that having entered into the transaction each of these parties is conversant with these facts and items and is prepared to fulfil his obligation with reference to them. But there is a broader and more important light in which this matter must be viewed. No society, organization or profession that exists for selfish purposes can long endure, and this is as true of our own profession as it is of any other. Dentistry as a whole owes an obligation to society and to the world and every member of the profession owes an obligation to the profession as an integral part of that whole. No man is fulfilling his obligation to his profession, which his very entrance into it places upon him and so to society, who is not meeting in the largest possible way the needs of his profession and of society which is dependent upon his profession for its services. I do not know the cost in time and money to the producer or to the patient of the various systems of removable bridge work, but it is inconceivable that it can compare in economy from this point of view with modern fixed bridge work.

If the published records are true one promulgator of a system that bears his name said frankly in a lecture before the King's County Dental Society last winter that the productions by his sys-



tem are not for poor people. "That work is only for rich people," he is quoted as saying. Against that assertion I am proud to place the claim that modern fixed bridge work is good enough for Dives and within reach of all but Lazarus. Referring again to Dr. Stillman's statement that any good removable bridge operator can excel the fixed bridge operator in the making of a fixed bridge I want to add that he also can make a number of fixed bridges in the time he takes to make one removable bridge.

Now let us multiply this fact by the number of men who are spending their time and their energies in the production of removable bridges and then realize that for every one of these possible fixed bridges of modern construction, which fulfil in the highest degree the scientific requirements of oral restoration and which these superior operators might be producing, the economic conditions in the profession are depriving the would-be patient of any bridge at all, or else there is being constructed somewhere an inferior restoration by an inferior operator which sooner or later will cause such degeneration of the foundation as will bring about its entire loss or necessitate a reconstruction of the superstructure! It is proverbial that the work of inferior dentists is keeping the good dentists busy!

It must be patent to the most casual observer that there is a great economic waste going on in the dental profession, and while no doubt it will always be so in some measure it will be increasingly so as long as men capable of large production of a service which meets the genuine needs of the many are guilty of this extravagant waste of time and energy in the practice of Butchery de Luxe and oral jewelry for the few. This seems to me to make out an invulnerable case for modern fixed bridge work *vs.* removable bridge work.

When we come to compare that class of saddle dentures having bi-terminal fastenings, for which fixed bridge work might be substituted on the one hand or removable bridge work on the other, we find them to occupy a middle ground.

Gaining their support from the superficial tissues they require in many instances less security of anchorage to the adjacent teeth than is required for removable bridge work. This admits of simpler and less destructive devices than those for removable bridge work but necessitates more complicated ones than those required for fixed bridge work. These matters weigh directly for or against the patient and producer as the case may be. And so we might continue to sum up the advantages and disadvantages through the whole list of viewpoints, and it will be discovered that where there is a difference in values the superiority as between the saddle denture and the removable bridge will be on the side of the saddle denture and as between the saddle denture and the fixed bridge it will rest with the fixed bridge.

The next study of relative values comes naturally between the individual saddle with the bi-terminal anchorage and the saddle with lateral anchorage obtained by means of the cross bar for the upper jaw and the lingual bar for the lower jaw. It is obvious that the greater the number of available points of anchorage the wider the distribution of the stress and the less the stress that comes on any one point. Where, therefore, this lateral security can be added to the terminal points of anchorage the strain on these terminal points is reduced. This in many instances will admit of greater conservation of the tissues of the individual teeth used for anchorage purposes and is proportionately better surgery even though it does necessitate an additional tooth at the remote end of the bar that must furnish anchorage and that may need some alteration for that purpose.

The increased number of anchorage points certainly enhances the value of this restoration as an engineering project especially in cases where there is a weakened anchorage of one or more of the abutments. Its relative value esthetically need not be less and may be greater, depending upon the type of anchorage used at the terminals. The chief point to be urged against it in this com-

parison is that the bar presents a limited surface and thickness of foreign material to which the patient must become accustomed. The gain in surgical and engineering value, however, outweighs in many cases this small inconvenience and gives the advantage to the saddle and bar denture. This is especially true where restorations are required for both sides of a jaw and where a bi-lateral saddle denture, obtaining mutual support for both sides from the bar anchorage, can be used instead of two individual bi-terminal saddle dentures.

When we come to make a comparison of this laterally anchored saddle, or bar and saddle denture, with removable bridge work, if we agree that it is to be preferred to the bi-terminal denture and that this bi-terminal denture is a more satisfactory measure than the removable bridge, we naturally conclude that the bar and saddle denture is a superior restoration to the type of removable bridge under discussion. And that this is true cannot be refuted on a scientific basis. It is an incalculable gain in surgery, engineering and workmanship. Its relative value esthetically depends upon the method of utilizing the abutment or anchorage teeth.

#### COMPARATIVE MERITS OF THE FIXED BRIDGE AND THE BAR-AND-SADDLE DENTURE.

Coming to the final comparison where there is opportunity for a choice, *i.e.*, between the fixed bridge of modern construction and the bar-and-saddle denture, it will be found that where a type of attachment is used for the bar and saddle composed of two parts, one of which must be and remain fixed to the anchorage tooth, there is no gain surgically over the simple preparation necessary for the bridge and that where clasps are used what is gained in surgery is lost in art on account of the display of metal. The advantage from the engineering standpoint may rest with either type according to the conditions and relations that obtain in the individual case. The details and difficulties of workmanship are more numerous and

greater in the case of the bar denture. The fixed bridge has all the advantages to the patient of nearness to Nature in conformation and fixation. It costs the producer less in time and money to construct, and while there is not the same disparity economically between the fixed bridge and the saddle-and-bar denture as there is between the fixed bridge and the removable bridge, there is a worthwhile difference in favor of the fixed bridge.

It is not possible or necessary to make fair comparisons between dentures that *may be* fixed and those that *must be* removable or between two types of removable dentures where inherent conditions eliminate the use of one of them. But there is a class of case which presents an opportunity for choice between two types of saddle dentures. This is the case where the molars are lost.

The simple anchorage used for the bi-terminal saddle denture will not suffice for the available single end and additional anchorage must therefore be secured. This brings a choice in many cases between destruction of the pulps in the bicuspid for purposes of compound anchorage at the single terminal or the use of lateral anchorage for the saddle by means of the cross bar for the upper jaw and the lingual bar for the lower. With two possible exceptions comparison from every point of view favors the lateral anchorage of the bar denture. First, it may or may not be less desirable from the artistic point of view according to the method of terminal anchorage pursued and, second, it presents the bar already described to which the patient must become accustomed. But in comparison with the atrocity of pulp and tooth destruction generally pursued for the terminally anchored individual saddle and the travesty on engineering which the whole project comprises, the impediment of the bar sinks into insignificance. This is increasingly true in cases where the need of bilateral restoration admits of the use of two saddles mutually supported by the bar instead of the two individual terminally anchored saddles.



## THE CLASP BRIDGE.

The sponsors for the clasp bridge have never claimed any but the most limited application for that production. This being true it can scarcely be compared fairly with those types or systems of either removable or fixed bridge work of general application. Where it can be used it gains immeasurably over the class of removable bridge work I have described on the surgical and engineering sides and requires less destruction of tissue even than the fixed bridge; but its slight gain surgically over the fixed bridge is outweighed by its inferiority from the engineering, the esthetic and the workmanship points of view. The technique of its construction is more exacting and more difficult than is that of the fixed bridge and it has the disadvantage to the patient of never becoming an integral part of the organism but like the glass eye and the toupée must always be removed and replaced, constantly calling attention to physical deterioration.

## THE ORAL RESTORATION OF THE FUTURE.

So much for the present status of oral restoration and the result of the efforts being made to fulfil its mission. I do not believe the confusion in which we find it is confined to this particular branch of our calling. I believe I am safe in saying that there never was a time in the history of the profession when the whole of its theory and practice was in such complete disorder, with confusion in every department, disagreement on every point and with no definitely settled plan of action for anything pertaining to it. Our thought is not fixed on any one method of procedure; no principle seems to be universally established; no operation standardized. The specialists in each of its departments are separated into schools and factions and the general practitioners running hither and thither after this champion of an idea or that promulgator of a system. The profession is full of modern examples of those earlier prototypes

of whom the Great Apostle said, "Every one of you saith, I am of Paul and I of Apollos; and I of Cephas; and I of Christ." There are those who say, "I am of Angle"; and "I of Greene"; and "I of Peeso"; and "I of Callahan." And the difficulty is the same today as it was in that early day. Blinded by the glare of the superficial and ephemeral, men fail to seek and to grasp the basic and abiding truths and principles which alone can serve as a foundation upon which to build securely and permanently.

In the matter of oral restoration, as in all other things, we stand between the past and the future, between history and prophecy, and while it has not seemed necessary to delve into the dark ages I have tried briefly to outline the conditions that have come down to us through evolution as the heritage of that history with such faults and virtues as it possesses not only as a basis for prophecy but as an incentive to the correction of its evils and the more intelligent guidance of its progress and control of its destinies.

What then of the future? I confess to a large measure of optimism. "In the beginning . . . the earth was without form and void; and darkness was upon the face of the deep.

. . . And God said, let there be light. . . . And God saw the light, that it was good: and God divided the light from the darkness." Here is an epitome of every great movement and improvement that the world has known since this first record of Divine activity. The beginning of the second great era was not unlike the first. "And she brought forth her first-born son, and wrapped him in swaddling clothes, and laid him in a manger; because there was no room for them in the inn." So it is that crudeness and obscurity characterize the beginning of everything worth while. Trace it to its source and ye shall find the babe wrapped in swaddling clothes, lying in a manger! The history of our own profession is not different. The offspring of the blacksmith shop and the barber's emporium, this husky young giant born in the lap of



crude mechanism has been running the gamut of his purely physical existence with its lack of restraint and disregard of the decencies and proprieties of a higher sphere of culture and of activity. He must shortly come through the preparatory school stage of his career, cut his wisdom teeth and go to college. With his mental growth and development will come a dawning of moral consciousness, a recognition of the rights of others, a realization of the obligation of man to man which our very existence places upon every one of us. He will not be so prone to bite off his neighbor's ear and to maim the jaw of his fellow man.

And finally there must come a spiritual awakening, a recognition of a higher plan and purpose, beyond the ability of his limited intellect to grasp perhaps, but which he is not at liberty to change or to mitigate at will or to suit to his selfish purposes. He must learn that we are fearfully and wonderfully made and that altering or tinkering with the plans of the Divine Architect are not to be indulged in with impunity or without penalty, and ultimately he must grow into an understanding of the sacredness of his obligation to the Creator and His creations and come into harmonious relation with them and into the joy of service for service' sake.

When the dental profession shall have been thus purged of its materialistic ideals and ideas and transformed into this stage of its existence oral restoration will share the glory of its achievements. Complete prophylaxis may come with the millennium but pathological developments will continue, at least, until that time and as long as they continue their ravages will make restorations necessary. What the future will bring in the matter of the relation of oral pathological conditions to systemic disturbances and what will be its bearing on oral restoration must be a mere matter of quantity and not of quality. It may mean more or fewer restorations. None can tell, but I have no reason to believe it will vary greatly. At the moment we "laymen" bid fair to be ground to bits between the upper and the nether mill-

stones of the pessimists and the optimists regarding focal infections.

The pendulum swings first to this side and then to that, but I think it will come to a stop presently over a sane middle ground. Our investigators will learn to classify conditions and relations as we do not know how to do now, and when they do we will extract some teeth that we are trying to save now and save some under conditions where we extract them now and the average will probably be maintained.

But whether we extract more or fewer teeth will not alter the character of the restorations made necessary nor the principles upon which they should be constructed. So that it is an easy and safe prophecy that there will always be plenty of restorative work to do.

But what of the restorations that must supply the need? Necessarily they must be either fixed or removable. Our awakened moral consciousness will force men to forego the petty considerations that influence them to this system or to that method and establish their efforts upon Nature's own fundamental requirements: Surgery, Engineering, Art and Workmanship. With this bettering of the professional conscience and the enlightenment of our clientele now rapidly progressing, the ill-fitting, gingival, irritating shell-crown atrocity and the slipshod kind of bridge construction that usually goes with it will be discarded along with that cut-throat and blood-sucking class of oral mechanical contrivances that regards nothing of God's creation sacred enough to stand in its ruthless path, whose perpetrators put prophylaxis to the sword and place sanitation on its throne, and the sum total of whose contribution to the advancement of scientific restoration has been to take it out of the blacksmith's shop and put it in the jeweler's laboratory.

There will be more scientific and a better variety of attachments and refinements of construction for the saddle denture to be used when the engineering possibilities will not admit of fixation, and some means also, not so set about with difficulties and exactions of tech-

nique but that the man with moderate skill can use it. There will always be places and no doubt some demand for limited specialties like the clasp bridge, but I am of the opinion that its technical difficulties will keep it less in favor than the virtues of the well-constructed specimens deserve.

But when the basic principles of oral restoration: Surgery, Engineering, Art and Workmanship are understood and accepted and the simplicity and accuracy of their application to the construction of modern near-to-Nature fixed bridge work put into effect I am fully persuaded that this will be the accepted type of restoration where conditions, from the engineering point of view, will admit of a denture without saddles for its support.

The small amount of tissue destruction it necessitates, its pulp conservation and prophylactic value commend it surgically; its grasp upon the foundation teeth and its mechanical efficiency comprise good engineering; the inconsequential display of metal in its attachments gives it esthetic worth; and the ease of its construction bring it within the capabilities of any man of average ability.

Its cost in time and money to both patient and producer makes it accessible to those who can pay for any but the crudest restorations.

There is nothing else in bridge or plate prosthesis that approaches it in nearness to Nature. What more can be said?

149 BROADWAY.

## A Removable Fixed Bridge.

By BERNARD FISCHLER, D.D.S., Brooklyn, N. Y.

(Clinic given at the New York State Dental Society Meeting, Albany, N. Y., May 12, 1920.)

THE old type of fixed bridge work can be improved upon so that the following disadvantages may be overcome: (1) Uncleanliness; (2) excessive grinding to parallel the abutments; (3) rigidity.

To accomplish this improvement the old type of bridge work is converted into the removable type by the use of the split pin and tube and supporting lugs.

Figure 1 shows a lower four-tooth bridge which is constructed as follows:

Full length or three-quarter length gold crowns reinforced with 22-k. solder are made and fitted in the usual way, impression and bite taken [twice] and the case mounted on an articulator. The crowns should be filled three-fourths full of investment compound and a plaster model should be made for the remainder of the model.

With a pair of drawing dividers, the

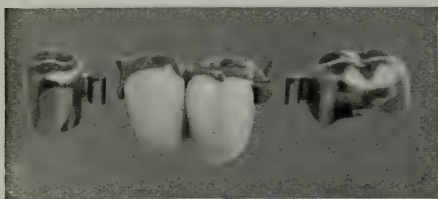
distance between the crowns (Fig. 2 A-B) is measured on a piece of air-chamber metal. With a right angle rule, a parallelogram is drawn, cut out, straightened in a vise, and waxed into place between the crowns in such a position as will allow room for the tube, bridge facings and gold backing. Also allow for the bite.

With a fine-pointed instrument, a line is marked off on each crown where the air-chamber metal touches. The metal is now removed and slots are ground into the crowns along these lines; using a fine, steel circular saw mounted on a mandrel. These slots are enlarged with an old inverted cone bur. The smallest size must be used and the slots made just wide enough so that the split pin holders will have to be wedged into the crowns (Fig. 3).

The distance c-d is measured and a

parallelogram cut out and fitted into position between the pins and in contact with the first parallelogram. This produces two corners into which the pins

FIG. 1.



are brought into parallel position. (Figs. 4 and 5.)

Investment compound is now poured over the pins and crowns in such a way

instantly when the solder flows to prevent the melting of the previous soldering operations.

The crowns are now fitted into the second impression by carving out the plaster to allow for the pins. These are covered with wax, a plaster model poured, and the case remounted on an articulator.

The tubes are now fitted over the pins and the arch of the bridge is waxed up with inlay wax, supplying lugs that extend and rest along the facial and lingual surfaces of the crowns. The lugs hold the arch firmly and take the strain off the pins. One-fourth of the tubes are not covered with wax and serve as additional springs that may be tightened to hold the arch in place. (Fig. 6 x.) Oil of cajuput is used to prevent the wax

FIG. 2.

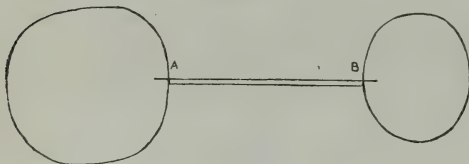
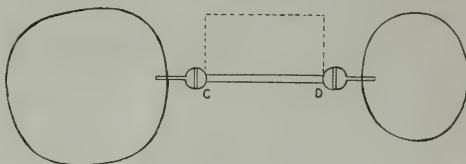


FIG. 3.



as to hold the pins to the crowns for soldering, exposing the point to be soldered and using 18-k. solder.

If the solder has not completely closed

from adhering to the crowns. The wax cusps are made by melting inlay wax into the proper size depressions of an oiled die plate.

FIG. 4.

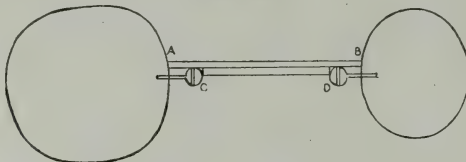
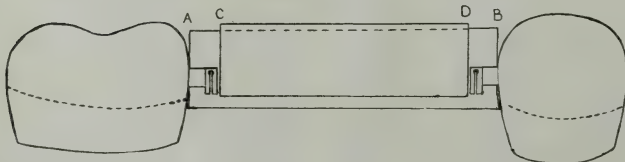


FIG. 5.



the slot, wire the split pin to the crown and complete the soldering from the inside of the crown. Care must be taken to withdraw the crown from the flame

Steele's facings with gold backings are used. Deep grooves are cut into the model, in which the necks of the facings are made to rest, and the cusps are carved



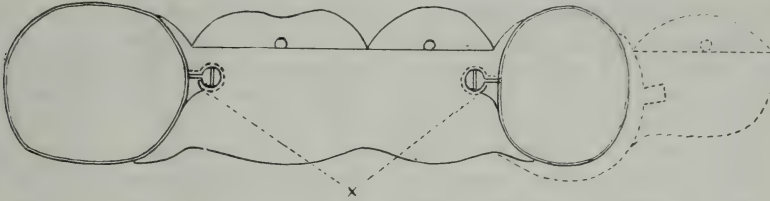
without making contact against the opposing teeth. The arch, when cast, does not go down into place as it does in the wax form, and allowance must be made for that.

The wax arch is dislodged by pressure on the under surface of the tubes, invested, and cast in scrap gold. The tubes must be carefully filled with investment

former. While in this position a coating of inlay wax is applied, the sprue wire attached, invested and cast. Four tubes are cast at the same time and completed by the addition of clasp metal tops soldered as shown in Fig. 7 B and C.

If a pin should break off or a crown should have to be replaced the method of repair is as follows:

FIG. 6.



compound to prevent the cast gold from entering.

Fig. 6 shows in dotted outline the manner in which an additional tooth may be added by casting to a cast clasp supporting the extra tooth.

The split pins and tubes may be home-made and cost about \$1.00 per pair for material which consists of 24-gage clasp metal plate, 12-gage gold and platinum round wire, Ney Oro casting clasp metal and 40-gage fine gold foil.

The pins are made as follows:

A pair of S. S. White cone-socket pliers are prepared with an extra socket (Fig. 7 D) to hold a piece of clasp wire, clasp plate, and piece of tin in the position shown. Pressure on the pliers will cause the tin to bend and hold the metals in proper position for soldering. A piece of wire one-fourth inch long is soldered to a piece of plate one-half inch long and serves as a tube former.

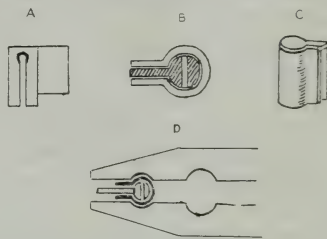
After the soldering of the pin holder to the pin with 20-k. solder the split is made with a fine vulcarbo disk and the upper end of the split is rounded with the smallest size fissure bur to prevent the outer half of the pin from breaking off when bending. (Fig. 7 A.)

Tubes are made as follows:

Pure gold foil is cut one-half inch by one-eighth inch and pressed over the tube

Remove the old crown and fit a new one. Place the arch in position in the mouth and take an impression. With the arch and crown in the impression, mark the line of contact between the arch and the crown. Remove the crown and cut the slot for a new pin. With

FIG. 7.



the pin in position, replace the crown in the impression. Fill the crown with investment compound and when hard, remove and solder as previously described.

A number of ball-shaped tubes cast in scrap gold should be kept on hand, to be used to cover the pins in the mouth during the time when repairs are made, to prevent laceration of the soft tissues of the mouth.

# CORRESPONDENCE

## “Oral Prophylaxis.”

TO THE EDITOR OF THE DENTAL COSMOS:

Sir,—Nowadays almost every article one reads in the dental journals (not to mention the literature of our medical *confrères*) has either for its introduction or subject the topic of focal infection and for the sake of variety, this communication will not be so burdened. That gem of our collection has already had its every side well polished: in spite of which we seem to out-Oliver Oliver Twist in asking for more.

Really after a few hours spent with our dental magazines, some of us must feel rather surprised upon observing patients who present themselves not totally edentulous, to find that they do not possess at least a leaking heart or a poisoned liver as a result of their dentition or what remains of it.

Paradoxically stated, the subject of this communication might be put into the form of a conundrum, *viz.*: What is it that every person needs and yet does not receive, that many dentists preach and not enough practice? *Answer*, Oral Prophylaxis.

We require some old philosophy for new heads and a little new philosophy for old heads. The good old-timer with his humble vulcanite plate was nearer to mouth cleanliness than many of our advanced gold crown artists or removable bridge engineers. The graduate of today with his prophylactic porte-polisher can accomplish wonders when compared with the antiquated dust-flying pumice-and-engine-brush tooth cleaner of yesterday. If this same young man will only seek initial decay as ambitiously as he embraces blind abscesses (the brighter ones can even distinguish Strep-

tococcus viridans in their radiograms) woe betide the unfortunate who has selected exodontia as a specialty. Keeping cavities small will not only keep the extractor out of a job, but what is more important, keep our teeth where they belong, in healthy sockets. Yet, seriously speaking, our specialists often do valuable service.

If the white-haired odontologist will prescribe the doctrine of prophylaxis, particularly to his younger patients, and advise his dentist son to benefit by the new régime of oral hygiene, we may sometime approach that long-sought day when a patient will come in to tell us that a brother dentist recently cleaned his teeth correctly and did not find it necessary to put on even a single gold crown.

If we could only get the happy combination! Education from both directions, the profession and the laity, will solve it. Well-educated dentists should know the propaganda of more prevention and less cure and every school child, by Government assistance, should be a living working model of this slogan. What our profession needs is less attention to fixed and removable clasp traps and more devotion to a good scientific cleaning of the teeth, respect for healthy gums, closer attention to small cavities and instillation of advice for home use, starting them while they are young. Of course, the necessity for legitimate and clean restorations will never cease to exist, since oftentimes unconquerable forces defeat even our most painstaking efforts to prevent or check disease, which is all the more reason for putting our patients on their guard.

A great medical man once said the best means of teaching was to reiterate, reiterate and reiterate.

Therefore with our hands out of our pockets, humanity in mind, and our professional nobility at stake, let us all

repeat, as often as we can, more prevention and less cure.

Will dentists ever learn?

Respectfully submitted,

JOSEPH HERBERT KAUFFMAN, D.D.S.  
601 W. 177TH ST., NEW YORK CITY.

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## "The Microscopic Anatomy of the Teeth."

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TO THE EDITOR OF THE DENTAL COSMOS:

Sir,—In your September issue a review appeared of J. Howard Mummery's book "The Microscopic Anatomy of the Teeth."

The general tenor of that review may be left to the unprejudiced judgment of your readers; who are, however, so numerous that we feel it is only just to the author that some notice should be taken of the statement: "In the chapter on the 'Dental Pulp,' we have the latest phase of the author's work regarding nerve endings, his position being rendered remarkably clear by the aid of a diagram on p. 221. We will make no comment except to say that we totally disagree with the author who has confused connective tissue fibers and cells with nervous elements, and to record the opinion of the highest authority on histology in the United States, who has definitely stated that 'the end cells' are certainly not nervous cells, but are prob-

ably connective-tissue elements. Figures 110 and 111 should have cautioned him (the author) as to their real nature."

Mummery's two original papers (1) "On the Distribution of the Nerves of the Dental Pulp" (1912), and (2) "On Nerve-end Cells in the Dental Pulp" (1918) were respectively communicated to the Royal Society of London by Prof. J. Symington, F.R.S., and Prof. Sir Edward Schafer, F.R.S.

We can hardly think that your reviewer has had an opportunity of examining the actual sections prepared by the author, but we desire it to be known that the most eminent physiologists and histologists in this country who have examined them are agreed that the structures shown are nervous in nature.

We are, etc.,

J. F. COLYER,  
MONTAGU F. HOPSON.

LONDON, ENGLAND.

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## "A Case of Systemic Infection of Pyorrheal Origin."

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TO THE EDITOR OF THE DENTAL COSMOS:

Sir,—In the September 1920 DENTAL COSMOS, on page 1147, Dr. A. S. Rochlin writing under the above caption, describes the treatment of pyorrhea as consisting of "thorough careful scaling and the use of disinfecting and *tissue regenerating agents*" [the italics are mine].

Is it possible that after all these years there has at last been discovered some

agent, be it drug or what not, that possesses the God-given power of actually regenerating lost tissue?

If so, think of the manifold possibilities that are opened up to those of us who have for years extracted teeth on account of caries, pyorrhea, trauma and any and all of the varied ills to which the oral cavity and its contents are heir. If a "tissue regenerating agent" is a



tangible thing and if it will (as the text of the article in question would lead us to believe) actually replace or renew the destroyed tissues, why should we worry over the thousand and one things that are daily, aye hourly, adding to the number of gray hairs in our heads and reducing us at times to a point where our abiding faith in the eternal fitness of things is sadly and severely strained? A cavity in a tooth? Apply the "tissue regenerating agent" and lo! the one-time cavity is no more. Pyorrhea? Again the "tissue regenerating agent" restores the diseased part to normal. A tooth is lost! Why a bridge, when the "tissue regenerating agent" will here too (as one would naturally understand) restore the lost tooth structure.

The writer is a comparatively young man in dentistry and can by no stretch of the imagination be credited with a knowledge equal or superior to that possessed by men older both in years and

experience, but he would like very much to go on record as being decidedly opposed to the eternal swabbing of the teeth and gums in various stages of infection, pyorrheal and otherwise, with drugs of all kinds, and the building up in the minds of persons afflicted, the impression that by means of drugs and especially by means of "tissue regenerating agents" it is possible to restore to normal a mouth in the last stages of oral desuetude.

It is possible that pyorrhea can be cured, but all biological laws argue against such a possibility; and certainly we would do better to pin our faith to something more substantial than the "tissue regenerating agents" to which the above writer so blithely and trippingly alludes.

Very truly,

T. C. BONNEY, D.D.S.

CITIZEN'S BANK BLDG., ABERDEEN, S. D.

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# PROCEEDINGS OF SOCIETIES

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## Dental Society of the State of New York.

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Fifty-second Annual Meeting, held at Albany, N. Y., May 13, 14, and 15, 1920.

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(Continued from page 1249.)

### SATURDAY—*Morning Session.*

The president, Dr. Gould, called the meeting to order at 10 o'clock.

The first item on the program was a paper by Dr. MILO HELLMAN of New York, entitled "Mechanics in Orthodontia from a Modern Aspect."

[This paper is published in full at page 1385 of the present issue of the DENTAL COSMOS.]

### DISCUSSION.

Dr. H. C. Ferris, New York City. We have listened to a very interesting paper by Dr. Hellman. It is broad in its scope, and entails so much that it is impossible to cover it entirely. There are one or two fundamental principles, however, upon which I shall touch.

We have, for the last five years, been making advances in our orthodontic procedure by coöperation, in order that we may be able to more definitely plan our operations for the understanding of our *confrères*, even if we cannot, with this biological material, accomplish one hundred per cent. in our restorations.'

Dr. Hellman has shown you some of his work. His results as an artist are individual and fine, but he cannot transmit to another his plan of procedure, or control his method when the device is in operation. This fault in the present-day procedure is generally recognized by orthodontists. Dr. Hellman has tried

to put himself on record against any effort to systematize an engineering plan that would be intelligible to all of us. That does not seem to be altruistic nor favoring an advance in the study of our calling to cope with the enormous demands of the public, and while he is opposed to any engineering plan for his mechanical procedure, he is compelled to use mechanical forces, with or without Nature's assistance, to accomplish the tooth movements that he attains. He practically instructs us to apply our forces without a plan and study the result by cause and effect.

He probably has not been educated in engineering, and is not familiar with graphics. A method of surveying a model and studying the teeth in three planes is most essential in my estimation. Engineers started to treat their problems by cause and effect in the infancy of their profession. They took a mining problem and put it through their engineering calculations; but efficiency rules came into play. People said: "We want this done quicker and more efficiently."

Orthodontia is being developed on an engineering principle, and whether Dr. Hellman wishes to accept it or not, it has come to stay. I am working with two or three prominent engineers and know of several other orthodontists who are studying in the same field. We are surveying our models and endeavoring to

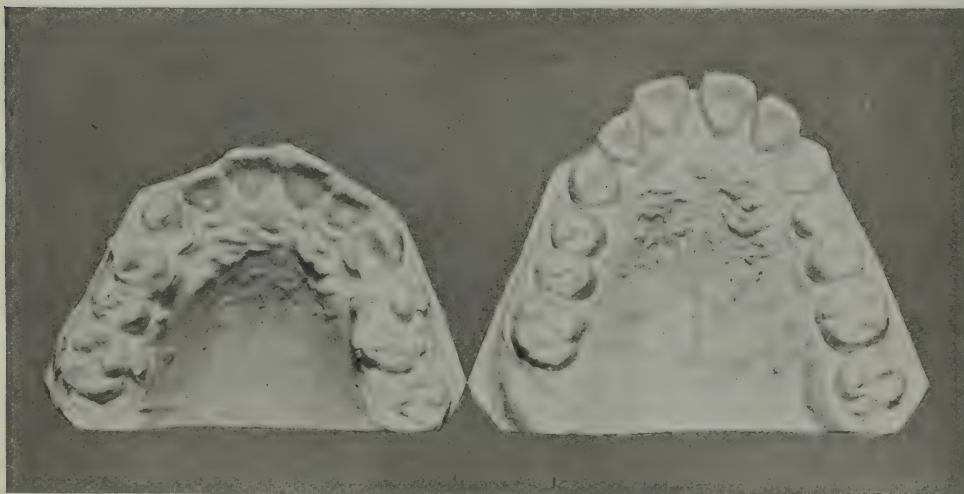
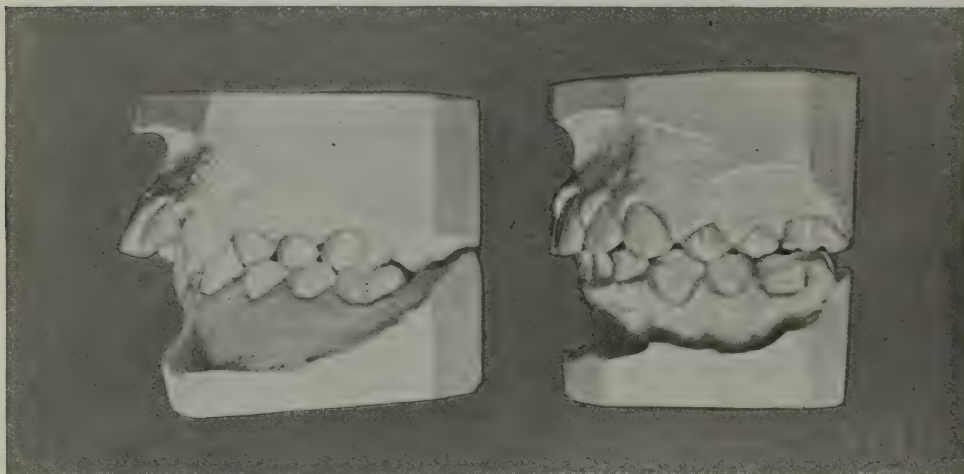
establish certain anatomical axioms which will enable us with reasonable corrections to predetermine an arch of occlusion which we will endeavor to attain.

that Dr. Hellman and others have been able to present to us, and for which we are duly grateful.

**Dr. F. L. Stanton**, New York City.  
I am greatly surprised to hear Dr. Hell-

FIG. 1 A.

FIG. 1 B.



Upper model of Fig. 1 B.

Upper model of Fig. 1 A.

We hope by this method to shorten our procedure, particularly in handling cases with a full complement of teeth. This does not mean that we do not take into consideration anthropological knowledge

man attack the introduction of engineering principles into the science of orthodontia.

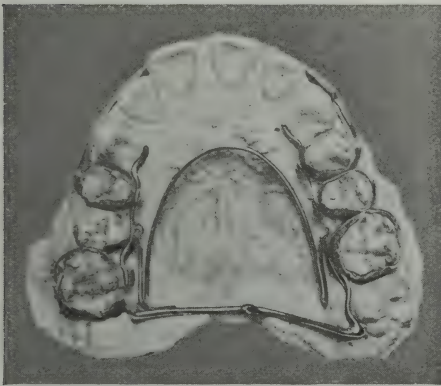
In 1915 I presented to this Society two engineering instruments, a survey-



ing instrument for mapping the denture and an arch determining instrument. Mr. Gilbert Dudley Fish, C. E., demonstrated the use of these instruments and the possibilities of using engineering principles in orthodontia. Both engineers that have worked with me, agree with Dr. Hellman that an engineer is untrained in biology and that orthodontia is a biological problem, but they do maintain that as long as highly trained biologists like Dr. Hellman use mechanical devices for moving the teeth, a knowledge of mechanics, as taught in engineering schools, would be helpful to say the least.

The orthodontists of today have no means of describing the positions of

FIG. 2.



teeth as they occur in malocclusion. To prove this point, it would be rather interesting to ask the following of the orthodontists present: Describe the malocclusion of the lower right central, if it should occupy the normal position of the lower left central incisor.

In science it is unfair to criticize another's work, as Dr. Hellman has done, unless the critic is prepared to show that he understands the various steps of the work.

Just as I was leaving for this meeting, a dentist gave me three slides, showing what can be accomplished by using engineering methods in diagnosis and appliance designing.

During December 1919, the case shown in Fig. 1 A, was presented to our engineering department for consultation, with the report that the case had been under treatment for four years by another operator. According to the Angle classification, the lower teeth are in "distal occlusion." According to the diagnosis made by engineering instruments and methods, the upper molar is mesial to its normal position. On this assumption, an appliance was made, as shown in Fig. 2.

The path of the upper left molar (to move from malocclusion to normal occlusion) was plotted and the center of rotation was found to be in the vault. A hinge was made at this point, as shown in the illustration. All the teeth on the right side act as anchorage against the two upper left molars. Force was applied by means of the inner expanding arch, to the left first molar, which, of necessity, turned out and back, around the predetermined center. After three adjustments of the expanding arch, a model was made, and is shown in Fig. 1 B.

**Dr. L. M. Waugh, New York City.**

The paper has been a very valuable one, not only for the general practitioner, but also for the orthodontist. It covers so many of the rudimentary phases of orthodontia, that every one, as the knowledge is grouped there, will profit by its reading and its study.

I think its aim is principally for the information of the general practitioner, and I think one of the greatest errors we make, as we set out to give our thought to a special line of work, is to think more of the mechanics, because as dentists we have been trained to think of how to do things. The profession is being trained now to think of the "why" of things. I think the greatest error we make as we emerge from general practice into orthodontia, is to confuse tooth movement with orthodontic treatment. We may, in prosthodontia, move teeth on a wax base on the articulator, and feel if we produce similar changes in the mouth that we have treated a case; but this is not a fair comparison. Or-

thodontia, for successful treatment, must be based upon as nearly as may be a correct conception of the cause of the malocclusion. We speak of normal occlusion so much, feeling it is that ideal condition of the teeth whereby the groove of the upper cusp occludes with the lower cusp, feeling that that is a harmonious condition of all the teeth of all the individuals that come to us. I am 5 feet, 4 inches in height, and you may be 6 feet, 2 inches. There is just as much variation in occlusion of different individuals, as in the stature of individuals, taken as a whole; so that instead of taking normal occlusion as our basis, let us take the laws of occlusion as a basis. We know there are disproportionate sizes of teeth in different individuals. We know there are cases where a normal occlusion would be an edge-to-edge bite, and the only way to overcome that is to space the upper teeth, or extract the lower teeth. Certain conditions are normal to certain races, so let us take as our basis the laws of occlusion.

I have been asked many times, and I have not spoken of this before in public, as to the virtue of engineering (I do not like that word in orthodontia) methods, as aiding us in determining the correct formation of arches. My answer is: "If you have no preconceived idea of what an arch should be, and you receive aid from engineering maps, by all means use them. If they help you to do better orthodontia, use them."

Speaking on broad principles, I do not believe the survey of casts is a satisfactory basis, unless one has means for making those surveys in his own office. Why do I not believe that the survey of models in another man's office is helpful to the man doing the work? First, because models are inaccurate. If I wish to measure the teeth, I do it in the mouth, not from plaster casts.

As a principle in orthodontia, we should guide teeth to their normal position, rather than allow them to come into improper places, and then try to force them into place.

The greatest change takes place at from eight to twelve years of age. It is

impossible to survey permanent teeth that have not yet erupted. Between eight and twelve, there are yet unerupted permanent teeth, and some deciduous teeth. How can a man make an accurate survey of teeth that are not yet erupted, when there is no consistency in the size of premolars and cuspids and laterals? The survey, I believe, is a helpful guide, and if it helps you, have it; but a man who studies jaws and normal arch form, will appreciate that there is not such a very great difference after all. We have narrow crania, and broad crania. We have large teeth in narrow crania, and small teeth in broad crania. The final adjustments must be made by Nature.

I may take a great big lower jaw, and contract the arch, and because that patient has an abnormally large jaw, that tongue will three years after mold that jaw. That would be a case, as Dr. Hellman mentioned, where it would be better not to have started. We find muscle pull, and this influence will narrow the arch.

The surveys will be valuable to you in that they will help to teach you what the general average of normal arch form is. From an orthodontic standpoint, if a man studies carefully the arch forms and shapes, I think the charts prepared by Dr. Pullen, of about 3000 skulls, and which I believe are in the museum at Washington, are very valuable. I think he makes the bicuspid regions a little narrow, I generally make them a little wider; but I know kind Nature will come to my assistance, if I make them too broad, and reduce them.

Therefore the surveys have not interested me personally, and I feel the careful orthodontists are not doing any better work than they did before the introduction of so-called engineering methods into orthodontia.

**Dr. Hellman** (in closing). The main issues raised by Dr. Ferris and by Dr. Stanton are exhaustively discussed in the paper itself. It would appear as though the arguments have not been listened to very attentively. Moreover, in several contributions which appeared recently



in the dental literature, on the problem of morphology of the teeth and its bearing on occlusion and on the dental arch form, the questions propounded by the gentlemen were adequately dealt with. Evidently these articles escaped the scrutinizing eye of these gentlemen.

The contention of Dr. Stanton, that on giving the size of a room its form will be self-evident, cannot be refuted. But brilliant as this idea is, it cannot be applied to teeth. The size of a room is usually given in three dimensions of space when it is desired to convey the idea of its form. *The mesio-distal diameter of a tooth, which is invariably used as a basis for dental engineering, does not convey in the least any conception bearing on its form.* Not even the mesio-distal convexity on the labial surface of an incisor, for instance, can be surmised by the expression of its mesio-distal diameter, let alone the contour of the entire crown. When the dimensions of the teeth are expressed with the same accuracy as those of a room, I shall be ready to accept them as a basis for the morphology of the dental arch, and consequently for all orthodontic procedure. Meanwhile, I shall await with anxiety the manifestation of the ingenuity of the dental engineer to show his ability by expressing in a practical manner the cubic dimensions of the crown of a tooth that will reveal its pattern, shape, contour and form.

Dr. Stanton's evidence, adduced to strengthen his arguments, was inadequate. Of the cases shown, one illustrated a poor result of the proverbial "other fellow," while his own illustrated the cast of an upper dental arch with an appliance *in situ*. Of the poor result there was evidence enough, because the casts showed the teeth in occlusion, or rather in malocclusion. But of his own result there was no evidence shown, because the teeth were not shown in occlusion. Occlusion, in my opinion, is the final testimony as to the success or failure of orthodontic treatment. The demonstration of an appliance upon a cast, like the display of a rattle to a crying baby, is calculated to illude. What in-

terests me is what did that appliance accomplish? And how permanent was the result obtained? Anything said failing to answer these questions frankly, honestly and sincerely, is misleading and confusing.

Dr. Stanton accuses me of using an obsolete nomenclature or terminology. In justification of this, I desire to say that it is always the greatest aim in my literary efforts to make myself thoroughly understood to the audience and readers. I am quite certain that I am not so old as to have outlived the terminology employed by the pioneers of modern orthodontia. And I am positive that the audience in this room has not failed to grasp the ideas conveyed in my paper. If, on the other hand, the engineer in Dr. Stanton's office does not understand this terminology, I shall consider it *his loss*. Dr. Stanton himself is thoroughly familiar with it, because he is one of those who originally gained the fundamental knowledge in orthodontia where these terms were coined.

Dr. Stanton says no one has a right to criticize, unless he has studied the other man's methods; in other words, I have no right to criticize the engineer, unless I have taken a course in engineering. I did not criticize his engineering principles but his orthodontic principles, and I have studied those. On the contrary, I am rather inclined to believe that the engineer has not studied orthodontia.

Dr. Ferris claims that engineering is important. I show in the paper that it is not. On that account Dr. Ferris deduces that I defeat therewith all methods of procedure. No, I do not. I recommend a study of morphology, physiology, comparative anatomy, etc., instead of engineering. If you should survey the characteristics pertaining to teeth throughout the animal kingdom, as I have, you will be impressed with the glaring truths advanced in my paper. If the gentlemen who criticized me would study morphology instead of engineering they probably would use the argument the other way.

Results in orthodontia, a few examples



of which were shown you today, are possible to obtain only by intense study, careful observation and close application of principles essentially associated with biological manifestations. I, therefore, challenge all so-called dental engineers to produce orthodontic results that will excel or even equal those shown you today. It must be emphasized that the number of these can be greatly increased. As it was demonstrated, these results are of permanent, physiological duration. If the engineers can show that by their methods these results can be surpassed, I shall be glad to retract all unfavorable comments. Only on that condition shall I be forced to admit that the acquisition of scientific knowledge pertaining to the treatment of malocclusion of the teeth is not important, and accept the view that a calculating machine is capable of substituting the intelligence of the human brain in the practice of orthodontia.

The next item on the program was the report of the Oral Hygiene Committee, by Dr. L. A. Timmerman, Amsterdam, as follows:

#### REPORT OF ORAL HYGIENE COMMITTEE.

ALBANY, N. Y., June 13, 1920.

##### TO THE COUNCIL:

*Gentlemen*,—The Oral Hygiene Committee respectfully presents for your consideration the following report:

The work your Committee on Oral Hygiene has accomplished the past year is so closely interwoven with that of the Oral Hygiene Inspector's office, that it will be difficult to avoid overlapping in some of the essential features.

There seems to be a general lassitude among the men who a few years ago were enthusiastic to take up any phase of Oral Hygiene extension. We also observe that school authorities are now asking for Oral Hygiene instruction, whereas a few years ago it was impossible to induce some schools to accept the services of a dentist. Conditions have been reversed. But the school authorities are not now satisfied with the local dentist as dispenser of mouth hygiene instruction. They are asking for men who have had some training which will especially qualify them for that duty.

With this demand before us it is evident that some effort should be made to meet it. Outside of Greater New York, Rochester, and Buffalo, there are 1200 schools that are in need of the information we are anxious they should have. It would require an Oral Hygiene inspector four years to make the round. The self-evident fact is that some assistance is necessary. A request for two assistants has been made at a salary of \$3000 each. That, with necessary expenses for traveling and present appropriation, would mean an outlay by the State of \$12,000.

Another plan has been presented that might prove equally good or better in some respects. That plan, briefly stated, is to appoint dentists in all parts of the State and designate them as Oral Hygiene lecturers; one or more from each county, as conditions might indicate. Some of the more populous might require three or four, while some of the northern counties of the Fourth District have no dentists. Each dentist so appointed should be informed that it will be necessary for him to prepare lectures for groups of teachers and for different grades in the schools; also that it would be required of him to be ready to respond to a call from the Oral Hygiene inspector. Any dentist thus prepared should receive at least his expenses, say \$5 or \$10, when leaving his home town or city. By such an arrangement \$2500 would supply all districts of the State with mouth hygiene instruction and no doubt would enlist some of the best men in the profession.

The Oral Hygiene Inspector's office has been in operation one and one-half years. To the profession the results have been gratifying and I believe equally so to the Department of Education. If so we should prepare to make an urgent appeal to the Department of Education for sufficient funds to properly carry out the work, and it is recommended that the Council take such action at this meeting as may seem wise to induce the State Department of Education to include in its next annual budget sufficient funds to give necessary assistance to the Oral Hygiene Inspector.

However, we must not forget that the all-important feature of the Oral Hygiene movement is Preventive Education. Reparative work is of but little advantage if not supported by hygienic measures.

The first labor of the year was to correspond with each dentist who the previous year had consented to deliver lectures or talks. The purpose of this correspondence was to advise each one to be fully prepared

for a call from the Oral Hygiene Inspector to appear before an audience of teachers or pupils in the interest of mouth hygiene.

On January 19th last a number of the members of the Oral Hygiene Committee met at the Educational Building in Albany to discuss matters pertaining to the subject. One of the important matters taken up was the suggestion that the by-laws of the State Society be so changed that hereafter each district would be permitted to select five members for the Oral Hygiene Committee at its annual meeting. The object of this is that at no time will the personnel of the committee be so changed that work once begun cannot be successfully carried out. Whereas under the present arrangement the committee can be changed each year, which makes a definite plan of procedure impossible. This suggestion was heartily indorsed by all present.

Another important matter discussed at that meeting was the publication of a bulletin. It was decided that Dr. Leak should proceed with this publication, the first issue of which should already have been received by each registered dentist in the State, besides numerous instructors throughout the State who are more or less interested in the subject of Oral Hygiene. Whether or not this publication can be carried forward in a permanent way and paid for out of the receipts for advertising is a question under consideration by the committee at the present time.

A letter from Dr. Leak follows:

In the beginning of the school year I sent out a circular letter to all of the city, village, and district school superintendents, telling them that we would be very glad to supply them with lecturers on Oral Hygiene to present lectures at their teachers' conferences. In response to these letters I received requests from more than one hundred for lectures at such conferences. I personally attended many of these conferences and gave lectures; in fact I devoted most of my time until the first of the year in doing this work. I also referred many of these superintendents to dentists whose names have been furnished me by the Oral Hygiene Committee of the State Society. In many cases it was impossible for superintendents to secure these dentists because of the short length of time between their informing me that they wanted such a lecturer and the time of their conference. However, I was able to secure some dentists to assist in this work and their efforts were appreciated by the school superintendents.

Many of the school superintendents made it known to me that if they could not have my services for these lectures they did not care for the services of a dentist in practice. In this they are partly right, because they were lectures to be given to school teachers, and many of the superintendents feel that they only want experienced speakers at their conferences and that the dentist in ordinary practice, though he may know his subject well, is not an experienced speaker and would, therefore, not be in a position to give the information in a proper manner to the teachers.

Some little time ago I sent a circular letter to the dentists whose names the Oral Hygiene Committee had sent to me as being willing to lecture on Oral Hygiene. I have not as yet checked off the replies to this letter. It is my impression that most of the dentists have replied and that about one-half of them have said they will not give such lectures, whereas the other half say that they will be glad to do so. In the case of those who have replied favorably I have sent letters to their school principals or superintendents informing them that such a dentist is willing to give lectures to the school children of their town or city, and to date five superintendents have responded, saying they have extended the invitation to the dentist, and I believe in some of the cases, if not in all of the five, lectures have been given. As soon as I can find the time I shall address another letter to these superintendents asking what progress has been made for having these lectures given. It is quite plain that it is necessary that the dentists shall be provided with outline lectures, if not the lectures in full, and I hope we shall be able to do this before long.

One of the most important factors in the promotion of Oral Hygiene work is the employment of dental hygienists by school boards. I have been very reticent about recommending the employment of dental hygienists by school boards because I have been unable to find the dental hygienists. As a direct result of the article, "Wanted, Dental Hygienists," which appeared in the *Bulletin* of the Oral Hygiene Committee, I have had responses from more than a dozen dental hygienists who are willing to undertake this work in our schools. This is most encouraging to me and I shall now make considerable effort to see that the schools employ these young ladies.

Very truly yours,

WILLIAM H. LEAK.



# REPORT FROM THE FIRST AND SECOND DISTRICTS.

In the early part of the summer Dr. A. H. Stevenson during a telephone conversation suggested to me that we try and get together with the First District Committee for some definite and constructive action.

We communicated with the Chairman, Dr. Matthew Carney, and the suggestion met with his approval, providing we could agree upon the plan already worked out and adopted by the First District Committee. It was decided and agreed that we work under the auspices of the Department of Health.

Dr. Carney was invited to several of the meetings of the Second District Committee and gave us a very definite and comprehensive outline of their plan of action for the year.

We adopted this procedure and assured the First District Committee that we would follow any constructive and reasonable plan.

The plan agreed upon was to circularize all clergymen of Greater New York and all school principals. Along with the letter to principals was sent a letter for the teachers which the teachers were to copy on the black-board and then have the pupils copy it to take home for the parents' signatures; these letters to be returned to the principals and the principals to send them to the aldermen of their Aldermanic District.

The first joint meeting was held on June 27th. Nine joint meetings were held during the year.

There were approximately two thousand (2000) letters sent out to clergymen, etc. Dr. Arthur Zentler was entirely responsible for these form letters and form cards. We congratulate and commend him for it and the efficient and earnest manner in which he discharged his duties as Secretary of the Joint Committee.

The response and coöperation from the circularization of these letters was gratifying and gave us an expression of public opinion. One alderman received seven hundred (700) letters from parents; another, one thousand (1000), etc.

The slogan adopted was, "A Free Dental Clinic in Every Public School."

On October 1st Mr. Block, representing the Halley advertising agency, placed before the committee a plan for a publicity campaign for the purpose of enlisting public opinion in the fight for School Dental Clinics. He was confident that it could be most successfully accomplished, but a project of this character would require quite a sum of money

to finance it. Several ways and means of procuring it were suggested and attempts made to test them out, but they were not successful.

The first budget meeting in the autumn was several weeks earlier than usual and interfered somewhat with the carrying out of the program.

In October a bulletin of the Joint Committee was published and used in the campaign by the committee. About three thousand (3000) bulletins were distributed.

Copies of the form letters, form cards, and bulletins used in the campaign were mailed to the principal dental magazines of the country and many of these published them. Copies of the above are included in this report. Five thousand (5000) reprints of this report have been ordered for use in future campaigns.

The committee took action regarding the Davenport-Donahue Compulsory Health Insurance Bill, going on record as opposed to its passage. Copies of a resolution passed by the committee were sent to the Senator of the district and to the New York League for Americanism.

At the final meeting of the Board of Estimate and Apportionment the Calman Dental Ordinance providing for nine additional dental clinics and eighteen dental hygienists was voted down.

On December 22d, through the courtesy and coöperation of the Allied Dental Council and Dr. M. S. Calman, members of the First and Second District Dental Societies, including members of the Joint Committee, appeared at the meeting of the Finance Committee of the Board of Aldermen on the above date in a final effort to secure the passage of the Calman Dental Ordinance. It was passed and signed by the Mayor, but unfortunately the Finance Committee of the Board of Estimate and Apportionment refused to appropriate the money for this purpose. Inquiries at the office of the secretary of the Board of Estimate and Apportionment as to the possibility of reconsidering this decision were met with the reply that the Mayor, the Comptroller, the President of the Borough of Brooklyn, and the President of the Borough of Queens voted in the negative, thereby making nine (9) negative votes against seven (7) affirmative, and there would be no chance for reconsideration, as the vote must be unanimous.

All the members of the Board of Estimate seem to agree, however, that this subject should be considered in the appropriation of 1921 budget of the Health Department.



The number of lectures given during the year were as follows: Mother's Clubs, 3; Schools (general assembly), 11; Y. M. C. A.'s, 5; Royal Arcanum, 1; making a total of 20.

It has undoubtedly occurred to you that much of the time was devoted to the propaganda for obtaining dental clinics, etc., and not so much time for lectures.

On October 2d a dental examination was made at the Girls High School, Nostrand ave. and Halsey st., Brooklyn, under the auspices of the Advisory Council on Oral Hygiene to the division of Educational Hygiene Department of Education, City of New York.

The following interesting report from Miss Caroline M. Wollaston, director of physical training of that institution, contains some interesting comparisons:

*Report of Second Dental Examination Made October 2, 1919.*

Number of girls examined in Feb., 2148; in Oct., 2092.

Number of cavities found in Feb., 7532; in Oct., 5185. Gain 2347 cavities.

Number of girls O. K. in Feb., 333; in Oct., 547. Gain 214 O. K. girls.

Number of girls examined in Oct. who were examined in Feb., 1326.

Number of cavities among these girls, 2508. Average number of cavities, 1.9. Gain 1.6, or 46 per cent.

Number of girls O. K., 451.

Percentage O. K., 34 per cent. Gain 19 per cent.

Average number of cavities for girls not in school in Feb. who have just come from grammar schools, 3.6. (One-half of all cavities are among these girls.)

On December 6th Dr. H. C. Croscup gave a lecture at Riverhead, L. I. About three hundred (300) were present, including principals and teachers, and much interest was manifested.

In December, at a meeting held in Dr. Hyatt's office in the Metropolitan Life Insurance Building, action was taken and plans instituted by the augmented Advisory Dental Council to the Department of Education to examine 25,000 high school students. Thus far nearly one-half of this number have been examined. The appended chart indicates the scope of the examination. Interesting data relative to the most susceptible surfaces of the teeth to dental caries, unerupted and extracted teeth, irregularities, height, weight, nationality, mouth clean, fairly clean, and not clean, etc., will be obtained.

The hygienist has finally been given an

opportunity in Brooklyn to demonstrate the value of her work at the bedside of convalescent patients in the Long Island College Hospital. The work was started April 12, 1920, with a section of fifteen (15) girls from Columbia, and will continue indefinitely.

It has been a pleasure to work with the First District Committee. There has been harmony and constructive effort from the outset to the end of the final meeting.

Respectfully submitted,

ORVILLE S. LONG, *Chairman.*

REPORT FROM THE FOURTH DISTRICT.

The Board of Education at Amsterdam has appropriated funds for a free dental clinic. The equipment has been secured and a dental hygienist engaged for the school year beginning next September.

Glens Falls has recently added a dental clinic by private subscription in the office of Dr. Hammond.

The General Electric Co. of Schenectady has established a dental clinic in connection with its hospital, Dr. Mead supervisor. Only X-ray and first aid work is done.

REPORT FROM THE SIXTH DISTRICT.

Binghamton, Elmira, and Ithaca are the only points of attack by the committee of the Sixth District. At Binghamton the dentists are gratuitously serving the children of two orphanages and the community house. The local dental society has succeeded in securing a fine equipment, which will be used in connection with the medical clinic for the schools. A dentist on half-time and two hygienists are employed.

At Ithaca a free school clinic is maintained two days of each week. A dental hygienist gives prophylactic treatment to all below the eighth grade twice each school year. Dr. Willis writes in part: "At first we worked for every child in the clinic who needed work, treating and saving badly broken-down sixth-year molars. We gave this up, and now start with younger children, and hope to get them to high-school age without decayed teeth."

The unusual feature of the Elmira school clinic is that it is supervised by the Board of Health instead of the Board of Education. A dentist is employed three half-days of each week and cares for the children of all the schools.

REPORT FROM THE EIGHTH DISTRICT.

The Eighth District is much alive to its needs and responsibilities in Oral Hygiene.

The municipal authorities of its various cities have responded nobly to the call for dental aid, showing their appreciation of its vital need as a public health service.

Buffalo, through its Department of Hospitals and Dispensaries, maintains free dental dispensaries at five of its health centers, employing seven dentists, and plans to have five more with a supervising dentist at their head. The school physician examines the children in the schools and the nurses take those needing treatment to the dispensaries. As a result about seventy-five children a day are being treated. Artificial teeth are also made for adults.

The new \$2,000,000 Municipal Hospital has both a dental and oral surgeon on its general and diagnostic clinical staff. The hospital houses a complete modern dental dispensary. Each incoming patient is given a dental examination.

Although Buffalo has no Eastman or Forsyth Infirmary, the teeth do occupy a very prominent part in its health work and the city is well covered by the Health Center Dispensaries. The city is fortunate in having a Health Commissioner and as heads of its hospitals and dispensaries men who are keenly alive to the fact that the dental is as important as any other branch of civic health work. They have the active coöperation of the dental profession, through the Eighth and city societies, the members of which are active in lecture work in the schools and clubs that their beneficent work may be farther extended.

Jamestown is much interested. Being an industrial city, its workers need and appreciate dental care. The local dental society is engaged in an intensive dental campaign by means of the press and lectures to the school children and the public. Their program has resulted in the appointment of a school dentist and the donation of a school dispensary by a public-spirited citizen in

memory of his son. These agencies are working miracles for the children. It is hoped soon to secure the appointment of an oral hygienist for further education and prophylactic work in the schools.

The Medine school children have all been examined this last year by local dentists and reports made. This year, under the supervision of the public health nurse, the pupils in the special help class (repeaters) have been given dental care, funds being appropriated by the Junior Red Cross.

The Common Council of Batavia has equipped a dental dispensary room in the new Municipal Building, the Batavia dentists having donated their services. Now the Board of Education has agreed to pay for a dentist one day each week who will take care of the present needs.

North Tonawanda and Niagara Falls have school dispensaries in operation, the city dentists doing the work, each city having one paid city dentist.

Lockport has plans under way to instal a dispensary at an early date.

By means of lectures given by volunteer speakers it is planned to reach the rural schools in order that the gospel of Oral Hygiene may reach every child in the Eighth District. Also it is hoped that every poor child needing treatment may be gotten into the near-by town Free Dispensary.

W. H. ELLIS.

In the closing sentences of this report it is befitting that we pay our last respects to one who has served on this committee from the first. We admired him and his work and miss his counsel and broadmindedness in all of our undertakings. Dr. W. W. Belcher has been called by the All-Wise Creator, and we bow our heads in submission.

L. A. TIMERMAN, *Chairman.*

(To be continued.)

# THE DENTAL COSMOS

A MONTHLY RECORD OF DENTAL SCIENCE.

*Devoted to the Interests of the Profession.*

EDWARD C. KIRK, D.D.S., Sc.D., LL.D., *Editor.*

L. PIERCE ANTHONY, D.D.S., *Associate Editor.*

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PHILADELPHIA, DECEMBER 1920.

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## EDITORIAL DEPARTMENT

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### An Index of Dental Literature.

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UNDER the auspices of the American Institute of Dental Teachers, a compilation of the periodical literature of dentistry of the United States, England, Canada, Australia and New Zealand for the years 1911 to 1915 inclusive is now approaching completion under the direction of Dr. Arthur D. Black, concerning which the announcement of the Secretary of the Institute makes the following statement:

Our literature is the record of our progress. Advancement from year to year should be based on the foundation of former years. An index is necessary to make the treasure-house of the past available.

The dental profession has been making wonderful strides in recent years: The world-wide mouth hygiene movement, the advanced requirements for admission to our schools, the lengthening of the course from three to four years, the recognition accorded dental service by our Government, the reorganization of our National and State Societies, the development of dental research and the proved relationship of mouth infections to general health have all combined to elevate dentistry to a position long coveted.



The one thing needed to sustain this forward movement—a complete index of our literature—is now so well along that a volume covering five years is ready for the printers and additional volumes are being rapidly prepared.

We republish this concrete statement for its sound reasoning and clear comprehension of the dental situation in order that we may give to it, besides our unqualified indorsement, such added emphasis and usefulness as may result from a wider publicity.

It is certainly true that dentistry has been “elevated to a position long coveted” and principally by the factors as related in the announcement above quoted, but these activities which have so markedly contributed to dental progress and the improved status of dentistry as a profession are but the material manifestations of a fundamental change of ideal in the dental professional mind, “the outward and visible sign of an inward and spiritual grace” as the catechism sets forth, *viz.*, the general recognition of the fact that dentistry is a health service and not a guild of skilled craftsmanship. From this conception has flowed the oral hygiene movement, the lengthening of the dental course, the recognition of dental service by the National Government, the reorganization of our National and State Societies and the development of dental research. More than this, it has altered the character and purpose of the dental curriculum besides adding to its length and it has stimulated an interest in dental research of necessity, because it has established our understanding and appreciation of the scientific method as the only rational basis of procedure in the quest for truth in contradistinction to the empirical and rule-of-thumb method of achieving results.

When this magazine came under its present editorial direction, now nearly thirty years ago, the office was periodically invaded by letters from interested readers warning the editor against the tendency to publish “scientific” articles and clamoring for the “practical” pabulum that would be “most helpful to the busy practitioner,” short, snappy papers that would interest the practical man by giving him “short cuts” and “hunches” in technique instead of wearying him with a presentation of principles. Notwithstanding these and other warnings, we made bold to publish the scientific researches of Miller, Black, Andrews, Williams and a host of investigators, both American and European, covering the application

of the scientific method to the investigation of every phase of dental interest. Today these records of scientific research are classics which not only justify the claim of dentistry to the status of a scientific profession but they are the pioneer work that blazed the way into then unknown fields and made the work of subsequent investigators possible.

Moreover, in the process of time, the principles evolved from these and later researches have been applied in practice so extensively that the art of dentistry has undergone fundamental changes and modifications. The principles underlying bacterial infection have absolutely determined the character of operative and prosthetic technique. That a restoration is mechanically excellent is not sufficient justification for its construction; it must first of all be hygienically right. It is now generally understood that the purpose of scientific research is the discovery of the truth by which our standards of action are determined and safeguarded, so that the searcher for the truth by scientific methods is no longer regarded as an impractical dreamer of dreams but as the seer and indispensable guide to better things.

Every man who in dentistry, as well as in other professional callings, would win for himself the gratitude of his colleagues and of humanity, as well as distinction for himself, can do so most successfully by adding to the knowledge of his calling. As Bacon has said, he is "a debtor to his profession" and the debt can be most adequately and acceptably paid in contributions of useful knowledge. The *sine qua non* as preparatory to successful original research besides an adequate educational training is a comprehensive knowledge of what has already been done, the history and *status præsens* of the art or science whose investigation is under consideration.

The growing interest in dental research has made necessary constant references to the records of past researches in our periodical literature. Only relatively few complete collections of dental periodical literature exist, and these are for the most part preserved in institutional libraries. The American Institute of Dental Teachers has wisely and most generously undertaken the codification and indexing of this vast output of matter, thus rendering it quickly accessible to the investigator in any department of dental science or art.

The scientific researcher, he who embarks upon the exploration of the unknown, does so at his peril, the peril of his reputation and the validity of his findings, unless he shall have first informed himself as to what has been already recorded in the field of his special interest. Otherwise he is guilty of duplicating already accepted findings at the waste of his own time and energy and those to whom he addresses his reports.

If anyone doubt the continuous duplication of results, of wasteful multiplication of effort in dental scientific and quasi-scientific research, let him consult and consider the records of the past which the Index of Dental Literature will place before him. America has been discovered once; it is unnecessary to discover it again. Every student, every investigator or writer who aims to pay his debt to his profession by contributing to its store of knowledge should safeguard himself by reference to the records embodied in the Index. Its constant use will unquestionably enhance the value of our literature to every practitioner of dentistry, and is a most commendable undertaking on the part of the Institute which deserves and for which we bespeak the hearty support of the entire profession.

The Index is to be issued only by subscription, and in order to receive a copy, it is necessary to send your name and \$6.00 to Dr. A. Hoffman, 381 Linwood Ave., Buffalo, N. Y., the Secretary of the American Institute of Dental Teachers.

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## BIBLIOGRAPHICAL

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### "DENTAL SURGERY AND PATHOLOGY."

By J. F. COLYER, F.R.C.S., L.D.S.,  
Dental Surgeon to Charing Cross Hos-  
pital and the Royal Dental Hospital;  
Examiner in Dental Surgery Royal  
College of Surgeons of England.  
Fourth Edition with Illustrations.  
Longmans, Green & Co., 39 Pater-  
noster Row, London, E. C. 4.; Fourth  
Ave. and 30th St., New York; Bom-  
bay, Calcutta and Madras. 1919. All  
rights reserved; 854 pp. Price, \$12.00  
net.

As the title indicates, in this well-known and very comprehensive volume, therapy has not been divorced from pathology. The general plan and arrangement is the same as in the earlier editions. Indeed, possibly the most striking impression gained from a review of the book is that it has overgrown its skeleton. A large quantity of important and interesting information is here collected, but complete revision and systematization are needed to make it serviceable today.

A number of differences from the third edition are noticeable. The increasing recognition of the importance of oral sepsis is reflected, although without adequate reference to recent work in this field. In this connection should be read a simple and, for the purposes of this book, satisfactory chapter on the Bacteriology of the Mouth, by N. Mutch.

The entire treatment of the subject of root-canal work is chiefly of historical interest. Arsenious oxid is recommended

for pulpal devitalizations. For immediate extirpation of this organ, resort is had to "pressure anesthesia." Cresol with formic aldehyd is the medicament of choice for root-canal dressings (p. 466). Electro-sterilization or the use of dichloramin-T or of similar antiseptics is not mentioned in this connection. Also no reference to amputation of the root apex could be found in the book.

The sections upon the irregularities of the teeth and upon the eruption of the teeth (this latter by J. Thornton Carter) have been considerably altered and extended without arriving at a clear-cut or clinically valid system. Scant reference is made to Angle, and Mershon's work on the lingual arch is ignored.

Pickerill's influence is very marked in the chapter on Saliva. Colyer briefly refers to the prophylaxis of dental caries without mentioning the oral hygiene movement which is proving such an effective factor toward this goal in the United States.

The chapter on Fractures of the Jaws has been completely rewritten in the light of the experience of the past four or five years, although the treatment of gunshot injuries has been wisely compressed into narrow limits, with regard to the needs of the civilian dentist.

In comparison with the space given to many topics in this book, a trifle over two pages for the discussion of the application of local anesthetics seems too brief.

The illustrations of the book are numerous, simple, and to the point. The

binding of the book is poor and its entire mechanical make-up bears the stamp, unfortunately common in foreign post-war books, of sharply enforced retrenchment.

"THE QUANTITIES OF NITROGEN AND OF NITROGENOUS DERIVATIVES IN NORMAL AND IN CARIOUS TEETH." Inaugural Dissertation. University of Zurich. By WALTER BURGER.

As the title suggests, this study is not merely a chemical analysis of tooth structure, but bears directly upon the question of resistance and susceptibility to dental caries. Most previous analyses have dealt exclusively with the inorganic constituents present in enamel, dentin, or cementum. The fact that these investigations concentrate upon the organic constituents, bespeaks their importance. The material may be described as follows: 28 normal teeth of adults (representatives of all classes of teeth of the second dentition), 24 normal canines of adults, 17 normal third molars, 10 normal deciduous teeth, 12 normal teeth of cattle, 20 carious teeth of the first and second degree, and 20 carious teeth of the third and fourth degree of adults. The details of the chemical methods and the data are carefully given. The conclusions, deduced by Burger, follow:

1. Carious teeth have a higher nitrogen content than sound teeth.

2. The more resistant among the normal teeth are richer in nitrogen and correspondingly in organic constituents than the teeth predisposed to caries.

3. Nitrogenous derivatives, *e.g.*, amino-acids, uric acid, and tyrosin occur as well in carious as in normal teeth, and the quantitative relations (with the exception of tyrosin) are the same in this case as already above in 1 and 2 have been expressed for nitrogen.

4. Since according to previous investigations upon the inorganic constituents of the teeth, no nitrogenous bodies (ammonium salts, nitrates, etc.) occur, the nitrogen consequently must be bound in the organic constituents of the tooth. If the quantity of nitrogen, which is contained in the amino-acids, urea and tyrosin, be subtracted from the total quantity of nitrogen, the remainder affords a value from which, multiplied by 6.33 (protein coefficient), can be reckoned the protein content.

5. Dentin has a relatively high nitrogen content and a not inconsiderable quantity of nitrogenous derivatives.

A PRACTICAL TREATISE ON FRACTURES AND DISLOCATIONS OF THE JAWS. FOR STUDENTS AND PRACTITIONERS. BY CHALMERS J. LYONS, D.D.Sc., Professor of Dental Surgery, University of Michigan; Associate Surgical Staff University Hospital; Member of Staff St. Joseph's Hospital, Ann Arbor, Mich. 1919: Published by the Ransom & Randolph Co., Toledo, Ohio.

The author presents his book, as suggested in his preface, in an endeavor to meet the demand for a concise, simple, practical and modern book on fractures and dislocations of the jaws. This intensely practical treatise which represents methods and procedures evolved by the author through long years of practice of oral surgery eminently meets such a demand.

The book clearly sets forth in a concise manner methods of treating the various conditions which are met with in the daily practice of the oral surgeon, and also includes a chapter on "Gunshot Wounds" such as were so common in the recent war. As what may be termed a

"compendium" on practical methods and procedures in use by the dental surgeon, we commend the book to both dental practitioners and students who are particularly interested in the field of oral surgery.

GENERAL AND DENTAL PATHOLOGY, WITH SPECIAL REFERENCE TO ETIOLOGY AND PATHOLOGIC ANATOMY. A Treatise for Students and Practitioners. By JULIO ENDELMAN, M.S., D.D.S., and A. F. WAGNER, A.M., M.D. With 440 Illustrations, of which 340 in the Section on Dental Pathology are Original and 4 Colored Plates. St. Louis: C. V. Mosby Co., 1920. 573 Pages. Price, \$7.00.

A book of this nature is picked up with a great deal of interest and expectation. While here and there in the past a dentist has familiarized himself with the principles of general pathology and on this basis has sought to interpret philosophically the oral abnormalities, it is only in very recent years that systematic and adequate training in general and dental pathology has been presented to the dental student.

Part I. General Pathology. Less than two-fifths of the book is given to the consideration of general pathology. This phase of the subject is treated in a very elementary fashion and possesses the advantages of clearness and simplicity. It is well illustrated by well-known cuts from the classical works of Delafield and Prudden, McFarland, Stengel and Fox, Ziegler, Thoma, and Mallory. The most serious criticism would be that the anatomical manifestations of disease are emphasized almost to the complete exclusion of the physiological. Pathology is a biological science; and biology is essentially a dynamical science.

Part II. Dental Pathology. Most of Chapter X (Introduction) could be eliminated. In its place an extensive elaboration of the section on the "Predisposing Causes of Dental Disease" (p. 215) would be most valuable. Chapters XI and XII on the normal histology and development of the teeth could be dispensed with without impairing the worth of the book.

The author's exposition of the great dental diseases—caries, pulpal and periapical, and periodontal lesions—is for the most part simple and full, with an appreciation of the more recent work in these fields. The data and views of Gies and of Pickerill on dental caries and on the saliva receive full consideration. The subject of "pyorrhea alveolaris" is beyond doubt a complex and puzzling one, but any discussion of this problem cannot but gain unity and clarity upon accepting the conclusion of Talbot, Maurice Roy and Hopewell-Smith that the initial lesion of this condition is a precocious senile atrophy of the alveolar margin. Unfortunately Endelman and Wagner do not emphasize this view.

The functions of a course in pathology for the dental student are (1) to afford an opportunity for the development of the "sense of the pathological" (James Truman), (2) to supply the principles and the data necessary for an appreciation of the interrelationships of oral disease with disease elsewhere in the body. These functions are not fundamentally distinct. In putting them in practice they certainly are inseparable. The sense of the pathological will primarily help the student (and the practitioner, it must not be forgotten) in understanding and solving the concrete problems of his daily work. This book (Part I) seems unequal to the task of adequately



developing this "sense," because it treats pathology statically (anatomically) instead of dynamically (physiologically).

The chapter (XLIV) on "Mouth Infections in Their Relation to Systemic Disease" very well (as far as infection is concerned) meets one-half of the second function, namely, the mechanism of oral disease as a factor in disease elsewhere in the body. The other half of this second function—the converse of that just stated, namely, disease elsewhere in the body as a factor in oral disease—is relegated to a very inconspicuous position. Half a page on the "Predisposing Causes of Dental Disease" (p. 215) and an incidental reference here and there in the text, as Chapter XVII on syphilitic stigmata, hypoplasia (p. 253), predisposing causes to dental caries (p. 320), pyorrhea of systemic origin (p. 487), pyorrhea of gouty origin (p. 496), general predisposing causes of pulpal diseases (p. 506) suffice. There is plenty of material on this subject of disease elsewhere in the body as a factor in oral disease—it is at least as important and as interesting as its converse, and deserves as full consideration.

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### Books Received.

Books received are acknowledged in this column, and such acknowledgment must be regarded as a sufficient return for the courtesy of the sender. Selections will be made for review in the interests of our readers and as space permits.

"Dental Caries in Relation to Oral Osseous." By RAGNAR ECKERMANN, Ph.D., L.D.S. London: Williams and Norgate, 14 Henrietta st., Covent Garden, W. C. 2. 1919.

"A Vindication of Vivisection." A Course of Lectures on Animal Experimentation by Men of the Highest Authority in the Medical and Other Professions. Given under the Auspices of the Georgetown University School

of Medicine in Gaston Hall of Georgetown University, March 28 to May 16, 1920. FRANCIS A. TONDORF, S.J., Ph.D. Washington, D. C., 1920.

"Modern Dentistry." By JOSEPH HEAD, M.D., D.D.S., Dentist to the Jefferson Hospital, Philadelphia. Second Edition, Revised. Philadelphia and London: W. B. Saunders Company, 1920. Price, \$6.00 net.

"Fifth Annual Report of the Forsyth Dental Infirmary for Children." January 1920. 140 The Fenway, Boston.

"Essentials of Operative Dentistry." By W. CLYDE DAVIS, M.D., D.D.S., Professor of Operative and Clinical Dentistry and Dean of the Faculty, the University of Nebraska, College of Dentistry, Lincoln, Nebr. Third Revised Edition. St. Louis: C. V. Mosby Company, 1919.

"Hygiene, Dental and General." By CLAIR ELSMERE TURNER, Assistant Professor of Biology and Public Health in the Massachusetts Institute of Technology; Assistant Professor of Hygiene in the Tufts College Medical and Dental Schools. With Chapters on Dental Hygiene and Oral Prophylaxis. By WILLIAM RICE, Dean, Tufts College Dental School. St. Louis: C. V. Mosby Company, 1920. Price, \$4.00.

Mühlreiter's "Anatomie des Menschlichen Gebisses." (Mühlreiter's Anatomy of the Human Jaws.) Vierte Auflage mit Beiträgen aus dem Anatomischen Laboratorium der Universität von Amsterdam. Bearbeitet von DR. MED. DENT. TH. E. DE JONGE COHEN, Privatdozent an der Universität von Amsterdam. Mit 82 Abbildungen. Leipzig: Arthur Felix, 1920.

"Plastic Surgery of the Face Based on Selected Cases of War Injuries of the Face Including Burns." With Original Illustrations. By H. D. GILLIES, C.B.E., F.R.C.S., MAJOR R.A.M.C., Surgical Specialist to the Queen's Hospital, Sidcup; Surgeon-in-Charge of the Department for Plastic Surgery, Prince of Wales Hospital, Tottenham. With Chapter on "The Prosthetic Problems of Plastic Surgery," by CAPT. W. KELSEY FRY, M.C., R.A.M.C., Senior Dental Surgeon, Queen's Hospital, Sidcup, and Remarks on "Anesthesia," by CAPT. R. WADE, R.A.M.C., Late Senior Anesthetist, Queen's Hospital. London: Henry Frowde, Oxford University Press; Hodder and Stoughton, Warwick Square, E. C., 1920. Price, \$15.00.

"Ueber die Anatomie, Physiologie und Pathologie des Interdentalraumes." (Anatomy, Physiology and Pathology of the Interdental Spaces.) Inaugural-Dissertation zur Erlangung der Doktorwürde der Zahnheilkunde der Medizinischen Fakultät der Universität Zürich. Vorgelegt von WALTER ROOS, Prakt. Zahnarzt in Basel. Frobenius A. G. Basel, Schweizerische Gesellschaft für Graphische Kunst.

"Dental Materia Medica, Therapeutics and Prescription Writing." By ELI H. LONG, M.D., Professor of Dental Materia Medica and Therapeutics in the Dental Department, Emeritus Professor of Materia Medica and Therapeutics in the Medical Department, Professor of Toxicology in the Pharmacy Department, University of Buffalo; Consulting Physician to the Buffalo General Hospital. Fourth Edition, Thoroughly Revised. Illustrated with 14 Engravings and 18 Colored Diagrams. Philadelphia and New York: Lea and Febiger, 1920. Price, \$5.50.

"A Manual of Dental Prosthetics." By GEORGE HENRY WILSON, D.D.S., Professor Emeritus of Prosthesis and Metallurgy in the Dental Department of Western Reserve University, Cleveland, Ohio; Special Professor of Prosthesis in the Dental Department of the University of Southern California, Los Angeles, Cal. Fourth and Revised Edition. Illustrated with 451 Engravings. Philadelphia and New York: Lea & Febiger, 1920. Price, \$5.50.

"Porcelain Dental Restorations with a Chapter on Gold Inlays." By WILLIAM CAPON, D.D.S., Assistant Professor of Dental Ceramics, University of Pennsylvania; Author of Chapter on Restoration of Teeth by Cemented Inlays, American Text-book of Operative Dentistry; Fellow American Academy of Dental Surgery. Illustrated with 294 Engravings. Philadelphia and New York: Lea & Febiger, 1920. Price, \$3.25.

"Un Système de Traitement des Fractures des Machoires." Par le Dr. O. RUBBRECHT, Chargé de cours à l'Université de Gand. Bruxelles: Imprimerie Médicale et Scientifique (Soc. An.) 34, Rue Botanique, 34, 1920.

"A Practical Treatise on Artificial Crown, Bridge, and Porcelain Work." By GEORGE EVANS, D.D.S., F.A.A.D.S., New York State Board of Dental Examiners; Formerly Clinical Professor College of Dental and Oral Surgery, New York; Lecturer Baltimore College of Dental Surgery; Post-Graduates Lecturer Royal College of Dentistry, Toronto, Canada; Member of the National Dental Association; of the Dental Society of the State of New York; of the First District Dental Society of the State of New York; of the Odontological Society; of the American Academy of Dental Surgery; Vice-President of the New York Dental Club, etc. Eighth Edition, Revised and Enlarged, with 1143 Illustrations. Philadelphia: P. Blakiston's Son & Co., 1012 Walnut st. Price, \$7.50.

"The American Text-book of Operative Dentistry." In Contributions by Eminent Authorities. Edited by MARCUS L. WARD, D.D.Sc., Professor of Dental Metallurgy and Crown and Bridge Work, and Dean of the College of Dental Surgery, University of Michigan. Fifth Edition, Thoroughly Revised. Illustrated with 762 Engravings and a Colored Plate. Philadelphia and New York: Lea & Febiger, 1920. Price, \$10.00.

"A Text-book of Dental Pathology and Therapeutics for Students and Practitioners." Based upon the original of HENRY H. BURCHARD, M.D., D.D.S., Late Special Lecturer on Dental Pathology and Therapeutics in the Philadelphia Dental College. Rewritten by OTTO E. INGLIS, D.D.S., Professor of Dental Pathology and Therapeutics in the Philadelphia Dental College. Sixth Edition. Thoroughly Revised. Illustrated with 735 Engravings and a Colored Plate. Philadelphia and New York: Lea & Febiger, 1920. Price, \$7.00.

"A Practicable Root-Canal Technique." By ARTHUR BARTON CRANE, D.D.S., Washington, D. C. Illustrated with 48 Engravings. Philadelphia and New York: Lea & Febiger, 1920. Price, \$2.25.

"The Tonsil-Adenoid Clinic of the Rochester Dental Dispensary." Seven weeks: July 26th to September 10, 1920. An Account of 1470 Operations Performed.



## PRACTICAL HINTS

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This Department specially welcomes the brief presentation by our readers of any novel suggestions or methods which in their own practice have proved to be time-saving or to possess other features of advantage.

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### Novocain as a Skin Irritant.

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By ARTHUR E. GUPTILL, D.D.S., Fitchburg, Mass.

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NEVER having seen in literature any reference to novocain as a skin irritant, I think my recent experience in this connection may be of interest.

In the winter of 1919 my hands became highly irritated, chapped, cracked, and at times badly swollen, especially the third and fourth fingers of the right, and index finger and thumb of the left hand. In May my face and lips began to itch and became badly swollen. Both my hands and face itched to such an extent that I spent many sleepless nights in nothing short of misery. In July my face broke out with yellow blotches as large over as a half-dollar and raised up with a yellow crust, so that I was obliged to stay away from the office a few days, when they would subside, only to recur upon my return to the office. In August I went to the country with my face unpresentable and my hands in bandages, the skin more than half gone from the affected fingers, and the nail of the index finger of the left hand in a bed of pus, so that it came off altogether. During all this time I treated my hands, I think, with all the ointments known to science for skin troubles, had a Wassermann test, urinalysis, etc., and all negative. After remaining away for two months I

returned entirely well and healed. In two weeks my hands became bad again and my face so badly swollen that I was obliged to take to my bed. After getting better I began treatment of both hands and face with the violet ray by a skin specialist, from which I got some relief, and started to work again, only to be in bed again with a swollen face.

I had early discarded the use of every form of chemical used for the treatment of dead teeth. I had ceased to do much but a little exodontia and prosthesis. Physicians said that nothing could come from novocain. Finally I saw a dentist who had a similar trouble, and blamed novocain. I put aside my novocain and kept at work as best I could, and in two weeks was perfectly well again. In a few weeks I went back to my novocain, only to again start the trouble, which subsided upon ceasing to use it. I have since tried it out so many times that I am positive that novocain is a skin irritant to me. I tried novocain without the adrenalin for infiltration anæsthesia and got the same irritation. It gets to the face by carelessly expelling the bubble from the syringe, which fills the air with a fine spray. The third and fourth fingers of the right hand come



in contact with what liquid may have carelessly leaked out while injecting, and the index finger and thumb of the left hand come in contact with it while holding the lips or palpating. I have since found other dentists whose fingers were

affected similarly to mine, and who are confident that novocain was the cause. I am now using rubber gloves, being careful when expelling the bubble from the syringe, and get along very well.

## **A Dental Anomaly: Fused, Unerupted, Impacted Second and Third Molars.**

**By M. HILLEL FELDMAN, D.D.S., New York, N. Y.**  
CONSULTING DENTAL SPECIALIST, LINCOLN HOSPITAL.

Mrs. S.—, married, aged thirty-two, called on the writer recently for relief from a severe neuralgia on the left side of the face. Patient presented with swelling in the third molar region, both intra-orally as well as extra-orally.

A radiogram was made of the condition, and it showed what was apparently an unerupted impacted third molar. No thought was given to making an exposure of the area posteriorly to the supposed third molar, because the molar already erupted appeared to be the twelfth-year molar, and the mouth gave the impression that the sixth-year molar had already been extracted in childhood.

Operation revealed the condition

which is responsible for this report. A large fused body was removed, consisting of the second and third molars in perfect



fusion from apices to crowns, but in normal mesio-distal relationship. (See Figure.)

616 MADISON AVE.

## **Cast Gold Matrices.**

**By JOSEPH HOMER, Boston, Mass.**

TAKE an impression of the prepared cavity in inlay wax, extending the wax slightly beyond cavity margins. Run a model with inlay investment material. Separate and dip the model in melted inlay wax. This deposits a thin film of

wax over cavity walls and margins. The cavity is then filled with wax, burnished to margins of cavity, and cast. This technique is recommended for large and 22-k. inlays.

FORSYTH INFIRMARY.

## **A Fixed Bridge Abutment for Vital Teeth that More Nearly Reproduces Nature, and One that Can Be Made with a Minimum of Tooth Destruction.**

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**By J. B. ROBINSON, D.D.S., Farmington, Mo.**

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MODERN dentistry demands a fixed bridge abutment that requires a minimum of tooth destruction in all cases where vital teeth are to be used as bridge abutments. The simple crown and the three-quarter crown seem to be in popular favor with the average practitioner for this purpose.

The following method may be used to advantage both where we extend our band slightly below the free margin of gum tissue or where we construct a shoulder crown covering only the tooth structure above the point of greatest diameter. In constructing the modified gold crown we grind away enough tooth structure on the labial, lingual, mesial and distal portions of the main body of the tooth to allow for a neatly fitted band, which is contoured to fit the tooth snugly.

Next, the occlusal border of the band should be trimmed as low at all points as the lowest sulcus or groove in the occlusal surface of the tooth (bearing in mind that the occlusal surface has not been touched by a stone). Next, our well fitted and trimmed band is placed in position and a piece of modeling compound large enough to cover well the cusp portion of the tooth is softened and pressed to place, allowing the compound to extend well down on both the labial and lingual portions of the band, so that when chilled both the

band and compound may be removed intact.

After the band and compound are removed, invert the band and fill it with smoothly mixed plaster (Weinstein's stone preferred). When the plaster has hardened, soften the compound over a flame and remove it from the band. You will then have a plaster reproduction of the tooth with band in place. Our next step is to soften the wax in a Coates' swager and press the plaster tooth firmly to place, sinking the cusp into the wax end of the swager until the band touches the wax at all points.

Remove the plaster tooth with band and swage the cusp as usual. The cusp is now carried to the plaster model of the tooth with the band in place and carefully burnished and trimmed to fit, after which plaster is broken away from the band and the cusp attached in the usual manner, being careful to flow solder evenly over the cusp portion. When the crown is finished, refit on the tooth in the mouth and with the aid of articulating paper, cut the tooth to fit the inside of the cusp, grinding away just enough of the tooth surface to allow the band to come into place.

This procedure will give a result that is pleasing indeed, as the finished crown is "tailor made" in articulation and very little tooth structure has been needlessly sacrificed.

## The Wire Clasp vs. the Cast Clasp.

By W. H. JORDAN, Kansas City, Mo.

CLAIMING no originality for the wire clasp, I merely take the liberty of presenting some argument why I think the wire clasp will very quickly eliminate the cast clasp, and make it almost an inexcusable crime to extract any sound or nearly sound teeth in order to make a beautiful set of gold or platinum teeth, etc. A period of years is not necessary to prove to the ordinary individual that if he can make a restoration that affords comfort, service and nearly perfect esthetic effect, without any tooth mutilation, he has found the long-wanted method; and it does not take very much effort to get any price he thinks his time is worth. Therefore I make no apologies when I give eight reasons why the wire clasp should be used in all partial restorations.

1. The *wire* clasp has but a line of contact, because it is round on the tooth surface.

The *cast* clasp, when it fits, covers two-thirds of the tooth surface.

Which clasp is less liable to cause disintegration?

2. The *wire* clasp when properly made has a limited motion under stress.

The *cast* clasp has no motion under stress when it is properly made.

Which clasp allows the more natural tooth movement?

3. The *wire* clasp, because of its motion, allows the saddle to receive nearly all the force of mastication.

The *cast* clasp, because of its rigidity, does not allow the saddle to receive any of the force of mastication.

Which clasp puts the least strain on the abutments?

4. The *wire* clasp can be used no matter how badly the abutments are tipped, without losing any strength.

The *cast* clasp can only be used when the teeth are parallel or so nearly parallel that they can be forced apart to get the bridge into position, or else weaken the bridge.

Which clasp will have the greater possibilities?

5. The *wire* clasp because it is round and because it has motion, is practically self-cleansing.

The *cast* clasp because it has a flat surface, and has no motion harbors secretions.

Examine a cast clasp on the inside and see what you can scrape off.

6. The *wire* clasp because of its limited motion is ideal in cantilever restorations.

The *cast* clasp because of its rigidity is never indicated in cantilever restorations.

Which clasp is lessening our troubles?

7. The *wire* clasp being round, and nearly always at the gum line is seen very little.

The *cast* clasp being over nearly all the tooth surface, nothing else can be seen.

Which clasp does the patient prefer?

8. The *wire* clasp is an evil.

The *cast* clasp is an evil.

We are duty bound to always select the lesser evil in everything we do for our patients. I will leave it to the reader to say which is the lesser evil.

BRYANT BLDG.



# REVIEW OF CURRENT DENTAL LITERATURE

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[*Proceedings of the Pathological Society of Philadelphia*, n.s., XXII, 58. 1919.]

## **Contribution to the Surgical Pathology of Ranula.** BY P. G. SKILLERN, JR.

The case (negress, aged twenty-eight years) clearly indicated that ranula is the result of hydrops of the sublingual bursa, having no other connection with the salivary glands than that of neighborhood. Cure was effected by suture obliteration of the orifice of communication through mylohyoid, followed by tamponade of cervical portion and marsupialization and tamponade of oral portion.

[*La Revue de Stomatologie*, 1920. XXII, pp. 493-508.]

## **The Dental Factor in Alopecia.** BY L. ROUSSEAU-DECALE.

In an analysis of more than 1000 cases of alopecia, dental irritations (difficult eruption, gingival and periodontal infections) were regarded as the predominant, the possibly sole exciting factor, in about ten per cent. In about twenty-five per cent. of the 1000 cases the dental factor was the most important, though obviously associated with irritations in other areas, *e.g.*, gastric, pharyngeal, pulmonary. Further, in many of the remaining sixty-five per cent., the dental factor plays a recognizable rôle.

A distinct correlation exists between the site of the dental lesions and the site of the alopecia. A line drawn from the commissure of the lips, through the lobule of the ear, to the external occipital protuberosity, divides the head into two zones:

(1) Superior, where are reflected the irritations originating in the maxillæ, and (2) inferior, where are reflected the irritations originating in the mandible.

In each of these zones the irritation originating from a given tooth is localized in a region, the more posterior as the more distally placed is the tooth in question.

[*Dental Summary*, October 1920.]

## **Retaining Cotton Rolls.**

This may be done, particularly in the lower jaw, where the tongue tends to toss the rolls out of position, by slipping an ordinary rubber dam clamp over the tooth after the rolls are in place, allowing the beaks of the clamp to grasp a small portion of the roll between the clamp and the tooth. This will hold the roll securely and will also prevent the clamp from hurting.

[*International Journal of Orthodontia and Oral Surgery*, September 1920.]

## **A New Type of Molar Band and Locking Device for Lingual Appliances.** BY J. E. JOHNSON.

The band consists of a strip of metal with a staple soldered at a half inch from one end. The other end is trimmed so it will pass through this staple. This end is then passed through the slot in the jackscrew and bent down so it will not slip out. The nut is then tightened up until the sleeve of the jackscrew rests against the staple on the band, and the band is drawn up until it is approximately the size of the tooth to be banded. It is then slipped on the tooth with a jackscrew on the buccal side. With an orthodontic wrench the jackscrew is tightened until the band fits the tooth. Then the band is burnished roughly to the tooth. With a sharp instrument the band is marked at the staple; the jackscrew is loosened and the band removed. The band is soldered where it overlaps. The staple is unsoldered. The result is a plain band, accurately fitting the tooth, to which any attachment can be soldered buccally or lingually.

The lingual lock consists of a half-round bar soldered to the band; over this slips a clasp of clasp gold. There is a square pin hole through the clasp and bar occlusally. The pin is passed through the hole and drawn

over the occlusal surface of the clasp and burnished into the groove, so that the force of mastication will not dislodge it. Any form of lingual appliance can be soldered to this type of lock.

[*Dental Record*, London, May 1920.]

**A Note on the Changes in the Dental Arch During Childhood.** BY FRANK COLYER.

This study is based upon models of the jaws of three children (two girls and one boy) taken at fairly regular intervals from the age of three years onward. The children were breast fed; had not suffered from the slightest trace of nasal obstruction or required any operative treatment for tonsils and adenoids, and but for the usual children's illnesses, *i.e.*, measles and chicken-pox, they had never had any set-back to their growth. The conclusion to be drawn from the series of models described is that in the normal growing child, the permanent incisors, canines and premolars assume a distinctly larger arch than that occupied by the deciduous teeth. The way in which this change is brought about is not clear. Colyer thinks it cannot be attributed to a forward pressure exerted by the developing teeth, because the permanent canine lies above the deciduous canine, and slightly external to the arch, and the premolars are embraced by the roots of their deciduous predecessors. In the first years of life, there is reason to think that in the region of the canine it may be due to growth of the suture between the maxilla and premaxilla.

[*Journal of the National Dental Association*, October 1920.]

**Technique, Surgical and Systemic Results in the Preparation of the Mouth for Dentures.** BY WM. A. COLBURN.

The preparation of the mouth by means of surgery, to produce conditions favorable for artificial dentures, may be divided into four steps: (1) Removal of the teeth, (2) eradication of the pathological tissue adjacent to and beyond the tooth roots, (3) the creation of a favorable shape of both upper and lower arches, and (4) smoothing all high points to a definite general level.

Colburn advises alveolotomy in the extrac-

tion in all but quite loose pyorrhetic teeth. For the final smoothing, he uses a broad file with cutting edges so placed as to cut when file is drawn toward operator. The debris is removed and the flaps trimmed to within about two millimeters of apposition, and sutured with dermal silk, using interrupted suture. It is possible at this stage to place the tendon-like attachments of the muscles about where desired for favorable rim height of the intended denture.

With the application of the more recent methods of denture making, thorough surgery absolutely eliminates the necessity for the use of temporary dentures. Healing in the average case is obtained in less than three weeks and very little change is noticed, especially in the maxillæ during the following year. At the end of three or four weeks, the possibility of a practically permanent denture becomes a reality.

The systemic results obtained with this technique is in accord with the excellent results obtained in placing dentures. The patient's nutrition is improved and toxic symptoms cease.

[*Comptes rendus de la Société de Biologie*, 1919, No. 16, Séance du 31 Mai.]

**Cladotrix Infection of Dental Origin.** BY JOSEPH MENDEL.

Three cases mentioned; in two of which this newly-described microorganism (*Cladotrix matruchoti*) was found in pure culture. The identifying characteristics are given. The lesion is of insidious onset, in the form of a slight swelling near the apex of a carious tooth. It may reach the size of a nut or of a small egg. Mechanically, *i.e.*, by its presence alone, does it begin to annoy the patient. Hard at first, later a collection of fluid is recognizable within the swelling. On opening, a serous, almost transparent, odorless fluid escapes, with very few leukocytes, mostly polymorphonuclear. Involvement of the corresponding lymphatics does not occur.

[*Revue de Stomatologie*, 1920, No. 8.]

**Removal of Plaster Impressions with Scissors.** BY PONROY AND PATIN.

The authors have found this procedure very helpful in facilitating the fracturing of the



plaster impression in difficult cases. The impression often can be removed from the mouth a few seconds after becoming firmly set.

The impression tray is removed and the arch of the impression is taken between the blades of the scissors, which are then sharply brought together. This definitely determines the line of fracture. The scissors should be very strong, with rounded ends. The line of application should always be in the plane of a tooth, parallel to its long axis, preferably a tooth isolated and which is an important factor in the retention of the impression. A finger placed between the handles of the scissors will prevent the blades striking the tooth.

This is repeated at strategic points, determined by infection before introducing the plaster into the mouth, until the impression can be removed without effort.

[*Journal of the American Medical Association*, October 16, 1920.]

### **Clinical Study of Epithelioma of Lower Lip.** BY EVERETT S. LAIN.

This is based upon 122 cases (117 men, 5 women; ages from twenty-three to eighty-six years), extending through ten years. Clinically, Lain recognizes three separate though not sharply differentiated groups.

(1) Epitheliomata beginning as a seborehelic-like crest, a small recurrent vesicle or fissure—at first superficial, later becoming infiltrated and indurated; situated entirely or almost entirely on the cutaneous surface of the lower lip. Usually of slow growth and late metastasis. When this has occurred, they are easily palpable and accessible to treatment.

(2) In this group one-third or more of the lesion overlaps the muco-cutaneous border of the lip, though no glandular enlargement is easily palpated. Lymphatic involvement usually first in the suprathyroid of the deep submaxillary regions. These are the cases which in the past have so frequently deceived surgeon and radiotherapist by the rapid metastatic development within a few weeks or months after the primary growth had apparently been successfully treated or removed.

(3) In this group more than half of the neoplasm is situated on the mucous surface

of the lip. Of many weeks' or months' duration. Marked tendency to recur. Prognosis unfavorable.

Epithelioma of the lower lip is far more common in outdoor workers and most frequently is seen on the side of the mouth where a cigar or pipe is held.

Lain's experience emphasizes that (1) early diagnosis and treatment of the lymph drainage of the lips will materially raise the percentage of cures; (2) neither surgery, radiotherapy, nor any other one successful method of treatment should be used in all cases alike; (3) radium and roentgen-ray, singly or combined, give the most satisfactory results in a selected class.

[*Journal of the National Dental Association*, August 1920.]

### **Surgical Technique of Apicoectomy.** BY CHALMERS J. LYONS.

The author reports that for the past year, in the clinics of the University of Michigan, the method of reducing silver (Howe's) has been used to secure protection of the root end exposed by this operation. The details follow: The resected ends are sealed with rapid reducing silver, made up as follows: to a ten per cent. or fifteen per cent. solution of  $\text{AgNO}_3$ , enough  $\text{KOH}$  or  $\text{NaOH}$  is added to convert all the silver to the oxid. The oxid is carefully washed with distilled water and placed in an amber-colored bottle for future use. The oxid is carried with a glass rod into a drop or two of pure  $\text{NH}_4\text{OH}$  until the fumes of ammonia are no longer noticeable. This silver ammonium oxid solution is amber-colored. It is applied by suitable glass pipets to the dry resected end of the root. It is left there for from three to five minutes, after which a small amount of some reducing agent, as eugenol or a two per cent. solution of formalin, is added and left one minute; excess removed and the resected end burnished with a warm burnisher. The treatment may be repeated until there is a dense black layer of silver deposited over the root end.

All the unused silver ammonium oxid should be discarded immediately after use, because of the possibility of forming the explosive fulminates of silver.



# OBITUARY

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## Dr. William G. Ebersole.

[SEE FRONTISPIECE.]

DIED, October 6, 1920, at his home in Cleveland, Ohio, WILLIAM G. EBERSOLE, D.D.S.

Dr. Ebersole was born in Carrollton, Ohio, November 18, 1864. His early education was received in the local schools of that community. Dr. Ebersole spent some six years of his life in the business world, during which time he became acquainted with the dental profession, and saw from the layman's viewpoint a great field for humanitarian dentistry. With this ideal ever before him he sought further education, attending Ohio Northern University and Western Reserve University. From the latter he was graduated from the Dental School in 1895 and from the Medical School in 1896. After entering his active professional life he became more and more absorbed in the Public Health phase of the profession. He served as Chairman of both the Local and National Committees on Oral Hygiene; and later became Secretary-Treasurer of the National Mouth Hygiene Association, which was really a creation from his dreams of public service.

The dental profession has had few men who have devoted their time, thought, and energy, even life, to the ideal of teaching and

helping the children to appreciate and practice mouth hygiene as did Dr. Ebersole. So earnest and vigorous was he in prosecuting his ideals that many called him a hobbyist and a dreamer. He dreamed, yes, and then worked day and night to realize his dream. To him, more than to any other one man, do we owe the advance of the Oral Hygiene movement. He established mouth hygiene in the Cleveland Public Schools and there are today in these schools outfits placed there through his efforts that bear silent witness to the value of his dreams, for they are now in service every day.

Dr. Ebersole wanted to teach the children to so use and care for their mouths that they would not suffer the pain of dental lesions. This man exerted himself beyond human ability to endure in his struggle to make real his ideals. Finally his health broke and for more than ten years he has not been well, but no one ever heard him complain. He was always hopeful and cheerful during all the operations he was compelled to undergo. Though his years were less than some, he lived much more than most men, if we count life by good deeds accomplished.

Besides his family he leaves a host of friends who will mourn his loss and remember him to the end of their days.

H. R. C. WILSON.

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# ARMY AND NAVY DENTAL NEWS

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## Army Dental Corps.

THE members of the Army Dental Corps who attended the annual convention of the National Dental Association in Boston recently report that the sessions of that organization were most useful. Colonel R. T. Oliver, chief of the dental division of the Surgeon-General's office, was elected first vice-president of the association. On that occasion, also,

occurred the meeting of the Association of Military Dental Surgeons, when Colonel Oliver was reelected president and Lieutenant-Colonel G. H. Cassady was reelected secretary and treasurer and Commander Paul G. White, of the Naval Dental Corps, was elected vice-president, with Captain W. D. Vail, of the Army Corps, as editor of the Military Dental Journal, the publication of which was author-

ized, probably in Washington, to become the organ of the dental branches of the public service, including those of the Army, Navy, and National Guard. Commander H. D. Johnson, of the Naval Dental Corps, on duty at Newport, and S. D. Milliken of San Francisco were elected members of the council. No information is yet obtainable concerning the result of the examinations of candidates from the emergency and reserve personnel for permanent appointment in the Army Dental Corps. It is expected that announcement of these appointments will be made within the next two weeks. Instructors from the corps will be assigned, probably, to ten dental colleges throughout the country by the beginning of the next term in order to develop the dental sections of the R. O. T. C.—*Army and Navy Register*.

### Appointments.

#### Army Dental Corps.

The War Department on September 20th announced the following appointments to the regular Army Dental Corps:

1st-Lieuts.: Vivian E. Brown, Fort George Wright, Wash.; Ralph O. Leonard, 607 Broadway, Gary, Ind.

The following appointments were announced on September 21st:

1st-Lieuts.: Howard A. Hale, Letterman General Hospital, San Francisco; Milfred I. Merritt, 160 Sonoita st., Nogales, Ariz.; Frank W. Small, camp hospital, Camp Lewis, Wash.

The following appointment was announced on September 23d:

1st-Lieut.: Milton J. Damlos, dental infirmary No. 1, Camp Meade.

The following appointment was announced on September 28th:

1st-Lieut.: Willis B. Parsons, Hotel Traub, Coblenz, Germany.

### Promotions.

#### Army Dental Corps.

*Week ending July 31st.*

The following-named officers of the Dental Corps are being examined for promotion from the grade of 1st-lieutenant to that of captain: H. C. Feyler, E. M. Kennedy, H. E. Guthrie, J. H. O'Reilly, J. H. Jaffer, F. P. K. Barker, J. J. Weeks, F. E. Rodriguez, T. M. Page, C. B. Parkinson, J. H. Keith, W. H. Siefert, and W. W. Woolley. Examinations of other officers for promotion to the grade of captain will occur during 1920 as follows: H. Holmes, G. J. Sibley, G. B. Lacey, E. W. van D. Cowan, J. L. Olsen, C. W. Seogin, and J. G. Urban.

Promotion of the following in Regular Army announced: To be captains: 1st-Lieuts. George M. Krough and Beverley M. Epes, June 16, 1920.

*Week ending August 14th.*

The promotion of the following to captain in Dental Corps, Regular Army, from August 5, 1920, is announced: 1st-Lieuts. James B. Mann, Herbert E. Guthrie.

*Week ending August 28th.*

Promotion of the following to grade of captain in Dental Corps, Regular Army, announced:

To be captains: 1st-Lieuts. Howard C. Feyler, June 5, 1920; James H. O'Reilly, July 12, 1920; Joseph H. Jaffer, August 17, 1920.

### Assignments.

#### Army Dental Corps.

*Week ending September 11th.*

Lieut.-Col. Frank P. Stone from duty at Fort Logan, Colo., to Fort Crook, Nebr., Seventh Corps area, for duty as assistant to surgeon.

Lieut.-Col. George D. Graham from duty at Jefferson Barracks, Mo., to Baltimore, Md., Third Army Corps area, for duty as assistant to surgeon.

Lieut.-Col. John A. McAlister, Jr., from duty at Lovell General Hospital, Fort Sheridan, Ill., to Fort Benjamin Harrison, Ind., Fifth Army Corps area, for duty as assistant to surgeon.

Maj. John H. Snapp from duties at Lovell General Hospital, Fort Sheridan, Ill., to Fort Leavenworth, Kans., disciplinary barracks, for duty.

Maj. Lowell B. Wright from duties at Fort Leavenworth, Kans., to Second Corps area, Governor's Island, N. Y., for assignment to duty and station.

Capt. George M. Krough from duties at Fort Snelling, Minn., to Carlisle Barracks, Pa., medical department field service school, for duty.

Capt. Maximilian P. Bergeron, 1st-Lieuts. George C. Ackley, Lynn D. Blanchard, honorably discharged.

1st-Lieut. James J. Weeks from duty at Lovell General Hospital, Fort Sheridan, Ill., to Fort Snelling, Minn., for duty.

*Week ending September 18th.*

Maj. Emmett P. Varvel from duty at Camp Dodge, Iowa, and will report to commanding general, Seventh Corps area, for assignment to duty and station.

Maj. Lee B. Schrader from Fort Sill, Okla., and will report to commanding general, Eighth Corps area, for duty.

Maj. Thos. L. Smith and 1st-Lieut. Ernest F. Sharp from duty at Lawson General Hospital, Atlanta, Ga., and report by wire to commanding general, Fourth Corps area, for assignment to duty and station.

Cpts. Alvin E. Anthony and Roy M. Kisner from duty at Lovell General Hospital, Fort Sheridan, Ill., and report by wire to commanding general, Sixth Corps area, for assignment to duty and station.

Capt. Leroy T. Asche and 1st-Lieuts. John A. Belfils and George R. Scott are honorably discharged.

Resignation by 1st-Lieut. Chester P. Parkinson is accepted.

*Week ending September 25th.*

Lieut.-Col. Archibald L. Miller, Cpts. James M. Ackley, Leon M. Muedeking, Arthur G. Buehler, George R. Ellis, 1st-Lieuts. Henry A. Bartels, Edward Goldberg, Raymond S. George, John F. Dunfee, honorably discharged.

Maj. Frederick H. Saunders from duty at O'Reilly General Hospital, Oteen, N. C., to Camp Alfred Vail, N. J., for duty.

Maj. Brantley I. Newson from duty at Hoboken, N. J., to Walter Reed General Hospital, D. C., for duty.

Maj. Harold E. Albaugh from duty at Camp Sherman, Ohio, to Fort Riley, Kans., for duty.

Capt. Harold H. Buehler from duty at Hoff General Hospital, S. I., N. Y., to Second Corps area for duty.

Capt. Richard C. Hughes from duty at Camp Grant, Ill., to Eighth Corps area for duty.

1st-Lieut. Walter L. Knowles from duty at O'Reilly General Hospital, Oteen, N. C., to Eighth Corps area for duty.

1st-Lieut. Harold S. Whitney from duty at Hoff General Hospital, S. I., N. Y., to First Corps area for duty.

*Week ending October 2d.*

Capt. William T. Williams from duty with 1st Division, Camp Taylor, Ky., to Camp Dix, N. J., 1st Division, for duty.

Capt. Robert E. Motley from duties at Camp Dix, N. J., to Washington and report to attending surgeon for duty.

Cpts. William A. Spence, Walter J. Allison, Edward M. Atkinson, 1st-Lieuts. Frederick J. Marshall, Clarence C. Olson, John Grega, Jr., Oscar R. Charles, William Simone, John T. Cosler, James C. Williams, Charles

A. Shaw, James P. D. Mason, honorably discharged.

1st-Lieut. Arthur E. Brown from duty at Fort Porter, N. Y., to Baltimore, Md., Third Corps area for duty.

*Week ending October 9th.*

Cpts. Raymond F. Mulcahy, Solomon J. Z. Gantz, William W. McCrillis, 1st-Lieut. Clarence R. Benney, honorably discharged.

*Week ending October 16th.*

Capt. Edwin St. Clair Wren from duties at Camp Dix, N. J., to Baltimore, Md., Third Corps area for duty.

Capt. Roy M. Kisner from duties at Camp Grant, Ill., to Fort Benjamin Harrison, Ind., Fifth Corps area for duty.

1st-Lieut. Ralph O. Leonard from duty at Chicago to Camp Grant, Ill., for duty.

*Week ending October 23d.*

1st-Lieut. Albert Fields from duties at Camp Funston, Kans., to Eighth Corps area for duty.

1st-Lieut. Robert C. Craven from duty at Camp Grant, Ill., to Fifth Corps area for duty.

1st-Lieut. Rufus W. Leigh from duty at Fort Douglas, Utah, to Ninth Corps area for duty.

1st-Lieut. James B. Mockbee from station at Presidio of San Francisco, to Fort McDowell, Calif., for duty.

1st-Lieut. Victor L. Shepard to Camp Benning, Ga., for duty.

*Week ending October 30th.*

Maj. Benjamin J. Durham to Walter Reed General Hospital, D. C., for observation and treatment.

**Navy Dental Corps.**

*Week ending September 4th.*

Lieut. (J. G.) A. R. Gleitsman (D. C.), Naval Academy, to St. Louis.

*Week ending September 18th.*

Lieut. C. A. Chandler, Hampton Roads, Va.; to Rochester.

*Week ending September 25th.*

Lieut. W. F. Murdy, naval hospital, Norfolk; to Utah.

Lieut. P. W. Yeisley, Utah; to naval hospital, Norfolk.



*Week ending October 2d.*

Lieut. Hyman Mann, Connecticut; to Kansas.

*Week ending October 9th.*

Lieut. W. S. Thompson, Guam; to R. S., San Francisco.

*Week ending October 23d.*

Lieut.-Commander J. O. McAlpine, naval purchasing officer, Shanghai, China, to home.

**Discharges.****Army Dental Corps.***Week ending October 23d.*

Cpts. William S. Shuttleworth, George A. Cloutier, Jr., Elmer J. Nieder, John F. Ackley, 1st-Lieuts. Julius W. Sipple, William J. Mackey, Jr., Guy H. Jones.

*Week ending October 30th.*

Capt. Joseph L. Brown.

## SOCIETY NOTES AND ANNOUNCEMENTS

### American Institute of Dental Teachers.

THE next annual meeting of the American Institute of Dental Teachers will be held at the Claypool Hotel, Indianapolis, Ind., January 24, 25, and 26, 1921.

The program will contain much of interest in dental teaching methods and dental educational affairs. A cordial invitation is extended to all practitioners and others interested along these lines to attend the sessions.

ARTHUR D. BLACK, *Pres.*,

ABRAM HOFFMAN, *Sec'y*,

381 Linwood ave., Buffalo, N. Y.

### Chicago Dental Society.

JANUARY 27, 28, and 29, 1921, are the dates of the fifty-seventh anniversary meeting of the Chicago Dental Society. A cordial invitation is extended to members of all recognized dental societies.

M. M. PRINTZ, *Sec'y*,

25 E. Washington st., Chicago, Ill.

### Colorado Board of Examiners.

THE Colorado State Board of Dental Examiners will meet for the purpose of examining candidates for license to practice Dentistry and Oral Hygiene in Colorado, at Denver, Colo., at the State-house, beginning December 7, 1920, at 8 A.M.

For further particulars and application blanks address

R. C. QUICK, *Sec'y*,

310 Metropolitan Bldg., Denver, Colo.

### New Jersey Board of Registration.

THE State Board of Registration and Examination in Dentistry of New Jersey will hold their regular examination in the State-house, Trenton, N. J., December 6, 7, 8, 9, and 10, 1920. License fee, \$25; re-examination fee, \$10.

Practical tests required: Insertion of an approximal gold filling with the approximating tooth in position, compound approximal amalgam filling, and a silicate filling—candidate must furnish his own patient. Taking of impression, bite, selection of teeth, articulation, trial plate—candidate must furnish his own patient. Practical examination in mouth diagnosis.

Attention is directed to the following quotation from the dental law of New Jersey: "Applicant shall present to said board a certificate from the commissioner of education of this State, showing that before entering a dental college he or she had obtained an academic education consisting of a four-year course of study or the equivalent thereof." In accordance with this law the secretary will issue application blanks only upon presentation of the required certificate from the Commissioner of Education, State-house, Trenton, N. J.

Applications must be filed complete ten days before the date of the examinations. Address all communications for further particulars to

JOHN C. FORSYTH, *Sec'y*,

429 E. State st., Trenton, N. J.

### California Board of Examiners.

THE next meeting of the Board of Dental Examiners of California for the purpose of examining applicants for a license to practice dentistry in that State will be held in the city of Los Angeles, Calif., beginning on December 6, 1920, at 9 A.M. Each applicant shall file with the secretary of the board fifteen days before that date the following credentials: (1) Diploma or certificate of graduation from a reputable dental college approved by the board; (2) a diploma from an accredited high school or a certificate signed by a State superintendent of public instruction (or similar officer) to the effect that the applicant has had scholastic preparation equivalent in all respects to that demanded for graduation from a high school giving a four years' course of instruction. In lieu of high-school credentials, an applicant who has been a licensed practitioner of dentistry of some other State of the United States for a period of at least five years shall file such license or licenses, which will be accepted; (3) a testimonial of moral character; (4) a recent unmounted photograph of the applicant.

For further information, address

C. A. HERRICK, *Sec'y*,  
133 Geary st., San Francisco, Calif.

### Wisconsin Board of Examiners.

THE Wisconsin State Board of Dental Examiners will conduct a licensing examination at the Marquette Dental College, in Milwaukee, beginning Saturday, December 18th, and continuing until Friday, December 24, 1920.

The Wisconsin dental law provides that "No person shall be examined by the board for a license to practice dentistry in this State who shall not file with the secretary of the board credentials proving to the satisfaction of the board that he has a general education equivalent to that required for graduation from a high school or academy in the State of Wisconsin, having a four-year course beyond that of the eighth grade of the elementary school, and who is not a regular graduate of a reputable dental college or dental department of a university."

The educational credential showing graduation from a high school should indicate the

subjects taken in the high school, the number of weeks devoted to each, the number of recitations per week, and the units of credit. The credential should be signed by the principal of the high school or academy or the city superintendent of schools.

A statement signed by the registrar showing graduation from a reputable dental college is preferred to the actual dental diploma.

All credentials should be in the hands of the secretary of the board not later than December 11, 1920.

WILLIAM KETTLER, *Sec'y*,  
Berlin Arcade Bldg., Milwaukee, Wis.

### Montana Board of Examiners.

THE next meeting of the Montana State Board of Dental Examiners will be held in Helena, Mont., beginning the second Monday in January. Applications must be in the hands of the secretary not later than January 1st.

For further information apply to

FRANK J. BELL, *Sec'y*,  
Box No. 425, Billings, Mont.

### North Carolina Board of Examiners.

THE next meeting of the North Carolina State Board of Dental Examiners will be held at Greensboro, N. C., beginning promptly at 9 o'clock on Thursday morning, January 6, 1921.

For further information and application blank, address

Dr. F. L. HUNT, *Sec'y*,  
Asheville, N. C.

### State of Idaho Bureau of License.

THE next examination for dentists will be held in Boise, Idaho, on January 11, 1921. For application blank and law pertaining to this profession address Bureau of License, Boise, Idaho.

PAUL DAVIS, *Director Bureau of License*,  
Boise, Idaho.

### Delaware Board of Examiners.

THE Delaware State Board of Dental Examiners will hold their next examination in Wilmington, Del., Municipal Building, 10th and King sts., January 12th and 13th. For further information apply to

W. S. P. COMBS, *Sec'y*,  
Middletown, Del.

### District of Columbia Board of Examiners.

THE next meeting of the Board of Dental Examiners of the District of Columbia will be held January 10 to 13, 1921, at Georgetown University, Dental Department, 920 "H" st., N. W., Washington, D. C.

For application blank and further information address

Dr. WM. H. BARNHARD, *Sec'y*,  
1225 New York ave., N. W.,  
Washington, D. C.

### South Dakota Board of Examiners.

THE next meeting of the South Dakota Board of Dental Examiners will be held in Sioux Falls, S. D., January 11, 12, 13, and 14, 1921, beginning promptly at 9 A.M., Tuesday, January 11th. All applications must be in the hands of the secretary by January 1, 1921. Fee for examination, \$25; no reciprocity or interchange. Full information and application blanks may be had by addressing

L. R. WALSTON, *Sec'y*,  
Redfield, S. D.

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## UNITED STATES PATENTS

### PERTAINING TO OR APPLICABLE TO DENTISTRY

ISSUED DURING OCTOBER 1920.

#### October 5.

- No. 1,354,515, to JOHN R. SHEPPARD. Artificial tooth.  
No. 1,354,696, to HANS EMIL SCHMIDT. Tooth-crown fastening.  
No. 1,355,037, to EDMOND DZIUK. Toothpick.

#### October 12.

- No. 1,355,790, to JACOB LOWE YOUNG. Dental appliance.  
No. 135,448, to GEORGE R. GIBSON Co. Trade-mark for toothbrushes.

#### October 19.

- No. 1,355,888, to GILDEROY O. BURLEW. Dental abrasive or grinding disk.  
No. 1,356,352, to FELICIANO GONZALEZ. Dental tool.  
No. 1,356,372, to JOHN LAWRENCE KELLY. Dental tool.  
No. 1,356,487, to JAMES RUSSELL CLUXTON. Toothbrush holder.  
No. 14,961, to MEYER L. RHEIN. Dentifrice. (Reissue.)  
No. 135,593, to ALEXANDER A. ANZELL. Trade-mark for dental and surgical

mirrors, head-mirrors, laryngeal mirrors, and retinoscopes.

- No. 135,649, to THE DENTISTS' SUPPLY Co. Artificial teeth (Trade-mark).

#### October 26.

- No. 1,356,731, to WILLIAM M. MUCHOW. Means for preparing amalgam for dentists' use.  
No. 1,356,755, to WILLIAM W. BOLLS. Dental instrument.  
No. 1,357,063, to FREDERICK W. KORB. Burstand.  
No. 56,470, to O. H. and A. F. PIEPER. Design for a pedestal for dental apparatus.  
No. 135,917, to BLUE ISLAND SPECIALTY Co. Trade-mark for certain named dentists' and orthodontists' appliances.  
No. 135,965, to CUTTER TOWER Co., INC. Trade-mark for toothpicks.  
No. 136,196, to STEWART J. SPENCE. Trade-mark for dental plaster for use by dentists.  
No. 136,235, to VANADIUM CHEMICAL Co. Trade-mark for medicinal preparation for the treatment of teeth and gums.



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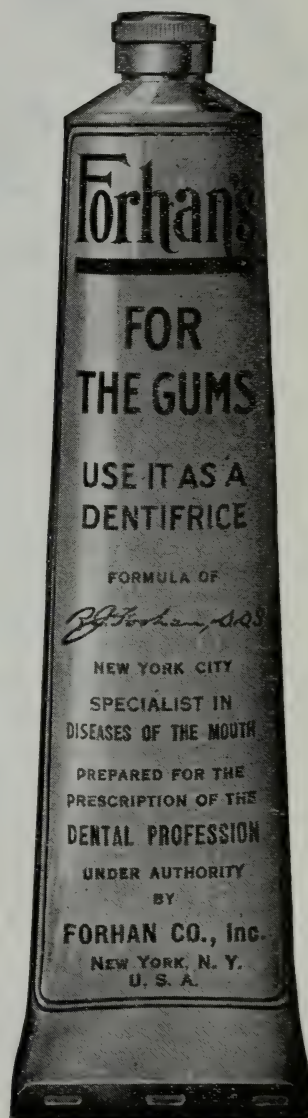


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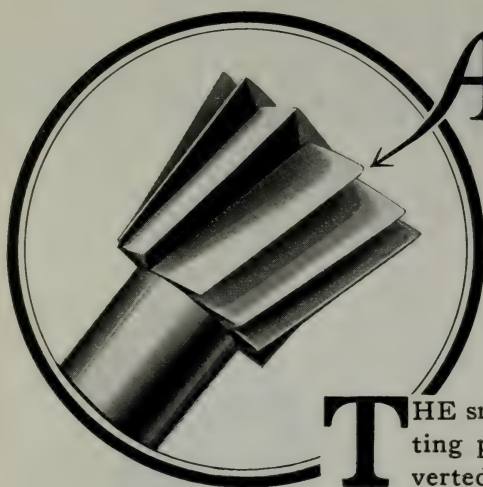
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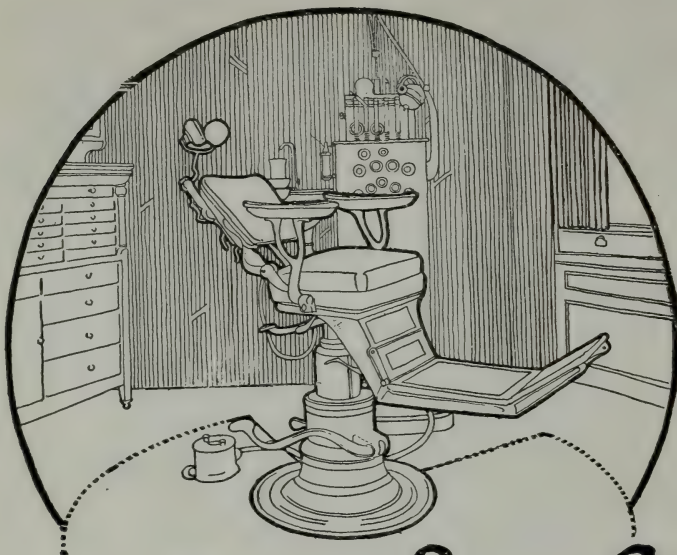
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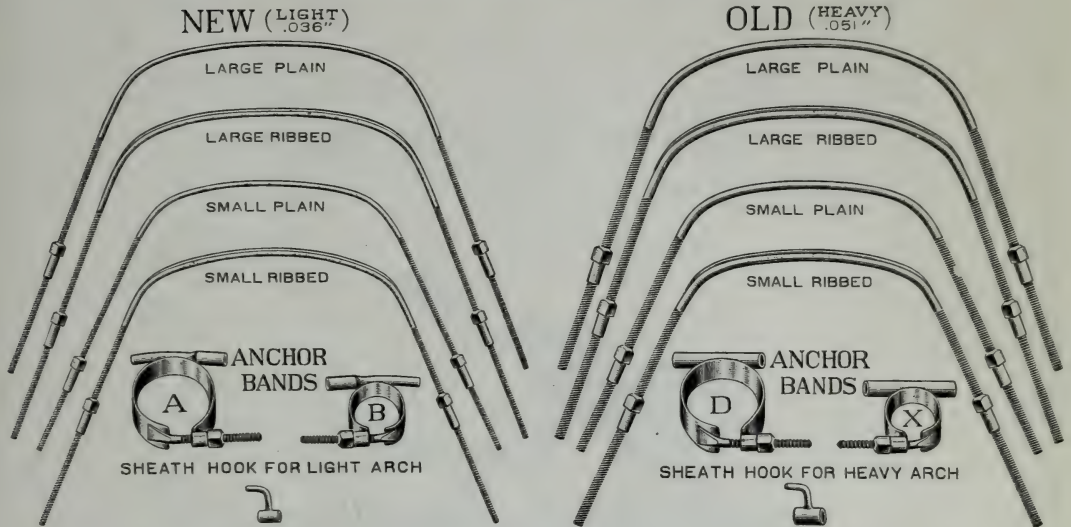
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This new light arch is like the older expansion arch except in its diameter which is smaller. Being smaller it is lighter, while none of the advantages of the heavy arch E are sacrificed. The springiness which has proved so useful in the Ribbon Arch is a feature of the new light expansion Arch. The smaller diameter makes for a lighter weight appliance, one that is less conspicuous and more comfortable to the patient; it allows the use of smaller attachments such as the new curved sheath.

A special *curved sheath* has been devised for expansion arch E (light) as the present curved sheath with flat bore would not accommodate a round arch.

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New *clamp bands* have been added with new curved sheath for light arches. These are in the same sizes and of the same metals as the old bands and are known as "A" (molars) and "B" (bicuspid) corresponding to "D" and "X".

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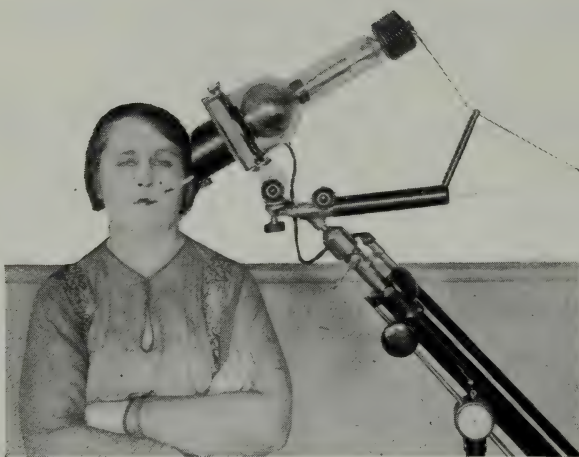
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SINCE it is an established fact that oral filth and infections of the peridental structures hold a causal relation to many systemic diseases, it follows that the dentist, with the physician, often finds it necessary to *insist* that the teeth be kept clean.

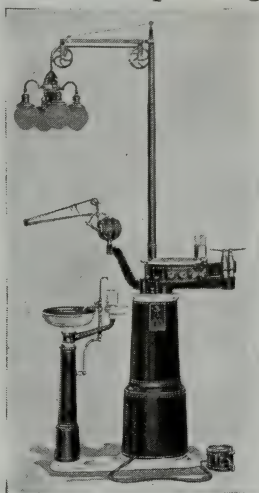
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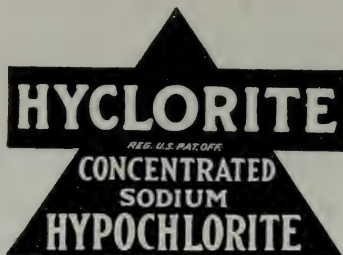


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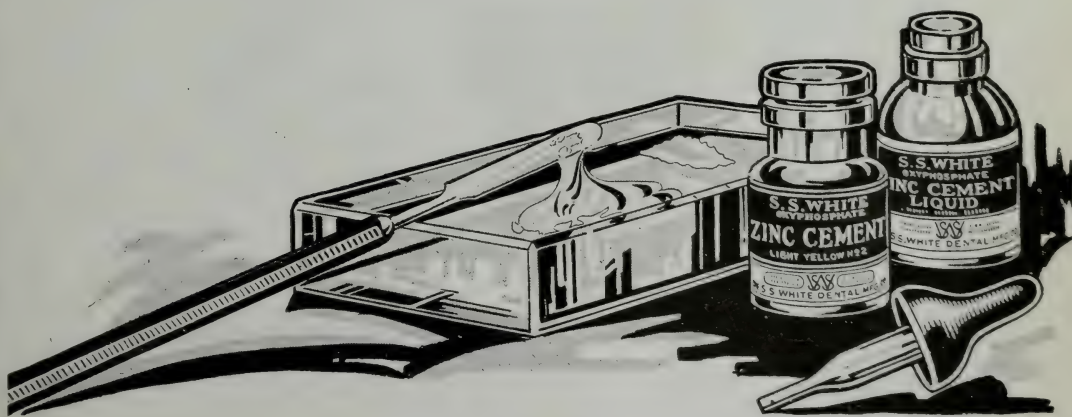
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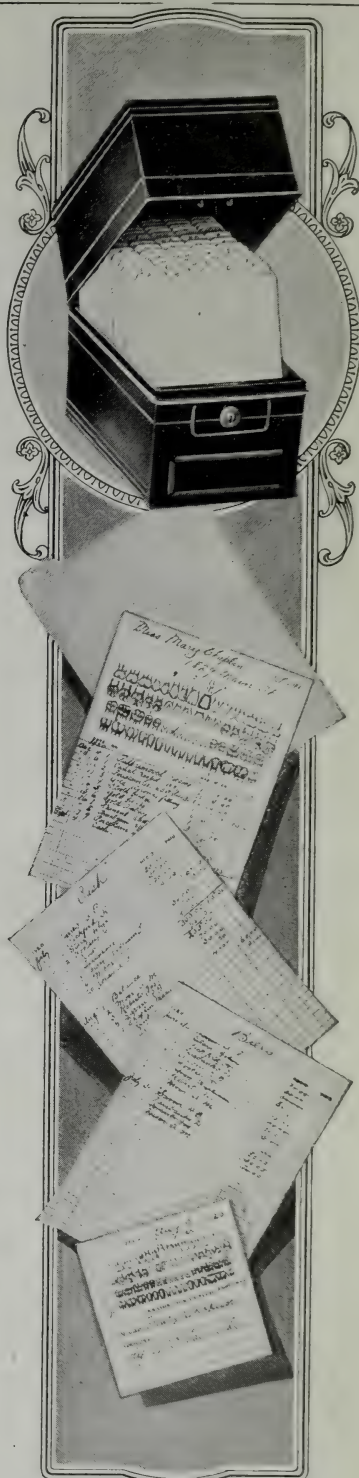
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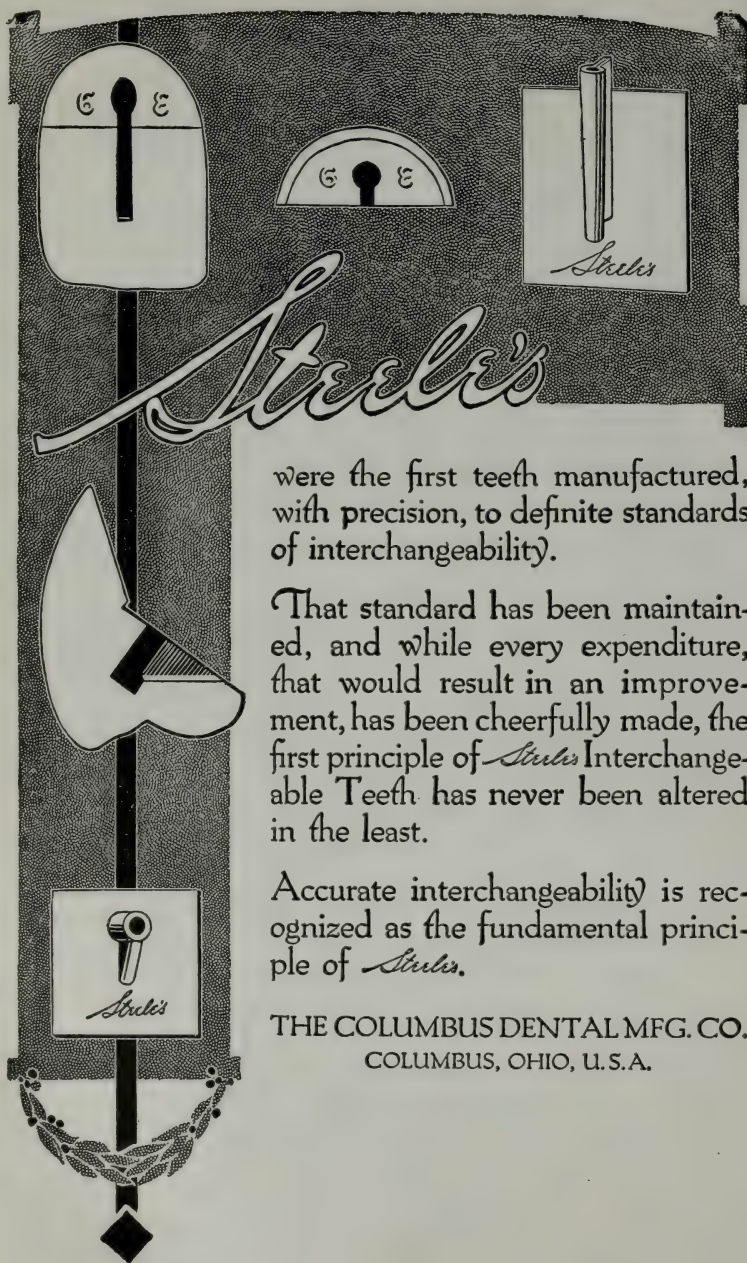
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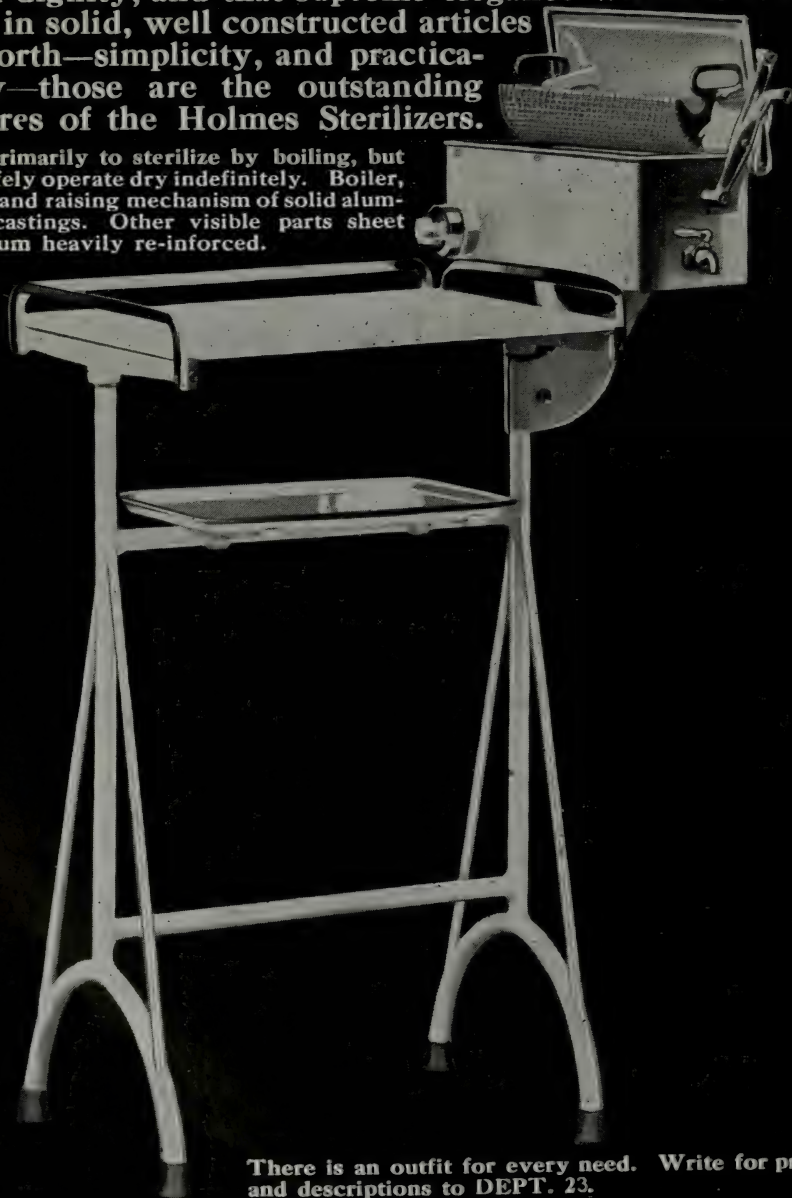
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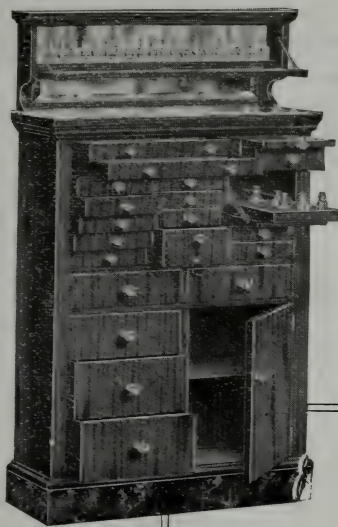
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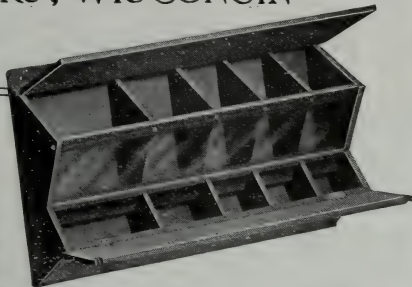




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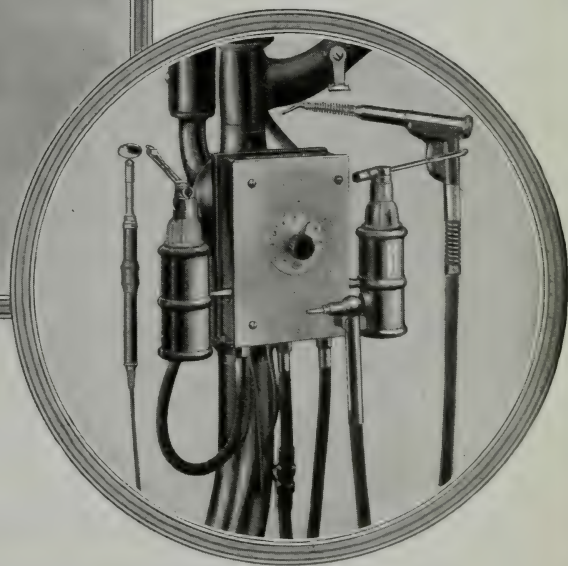
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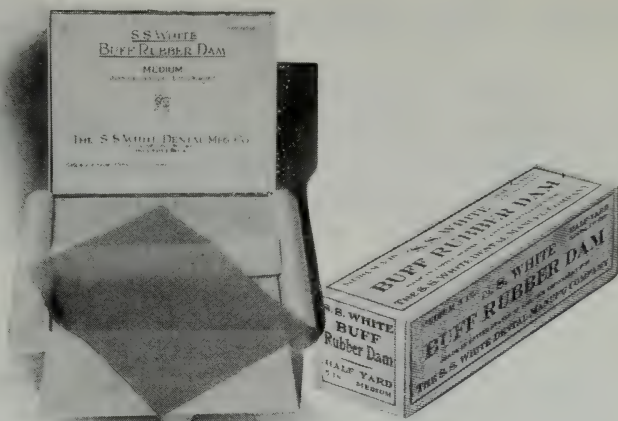
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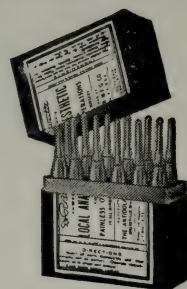
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is primarily to save the time of the laboratory man.

### JELENKO'S LINGUAL and PALATAL BARS

were designed with that idea always in mind. Their wide popularity proves the success of the designing.

#### JELENKO'S LINGUAL BARS

have an angular bevel on the surface adjacent to the anterior portion of the jaw.

The surface next the tongue is also beveled, following the contour of the mouth.

Ends of the bars are half corrugated, half flat. This combination makes a bar that will hold firmly in the rubber, bend without breaking and permit a firm grip with the pliers.

#### PRICES

##### 18 Kt. Cased Lingual Bars (Guaranteed one-fifth part Gold)

No. 1 Long, Medium and Short ..... \$1.50

##### 16 Kt. Solid Gold Lingual Bars

No. 1 Long ..... \$2.50

No. 1 Medium ..... 2.25

No. 1 Short ..... 2.00

##### 18 Kt. Extra Heavy Solid Gold Lingual Bars

No. 1 Long ..... \$4.00

No. 1 Medium ..... 3.75

No. 1 Short ..... 3.50

#### JELENKO'S PALATAL BARS

were designed because of a conviction that there was an urgent need of a *Ready-Made Palatal Bar*. Strong and resilient. They better every case in which they are used.

##### 16 Kt. Solid Gold Palatal Bars

No. 5 Short ..... \$3.00

No. 6 Medium ..... 3.25

No. 7 Long ..... 3.50

**ASK for JELENKO'S BARS and YOU WILL BE SATISFIED**

*For Sale at All Dental Depots*

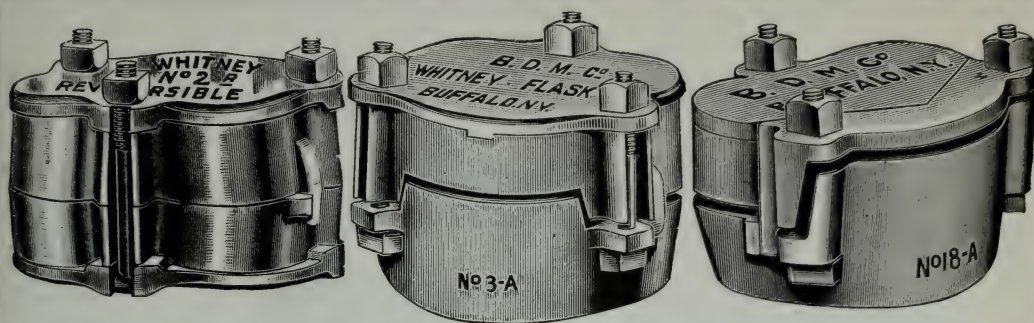
**J. F. JELENKO & COMPANY**

*Manufacturers of Dental Gold and Solder*

1 Union Square

New York, U. S. A.





## What Flask Shall I Use?

Every once in a while that question comes up, and it is a hard one to answer, because you are not always sure that the type of flask which will suit you best is to be had.

We have a booklet which has solved this problem for many a Dentist.

It covers the most complete line of the "BETTER KIND" of flasks made in this country, and we want you to send for it.

In it, our full line of flasks are illustrated, priced and described, and in a short time we will have a new member to add to the family; The VICTORY FLASK. It is of the Donham type, but it is just about three jumps ahead of the older styles, and it has won the praise of every Prosthetic man who has seen it.

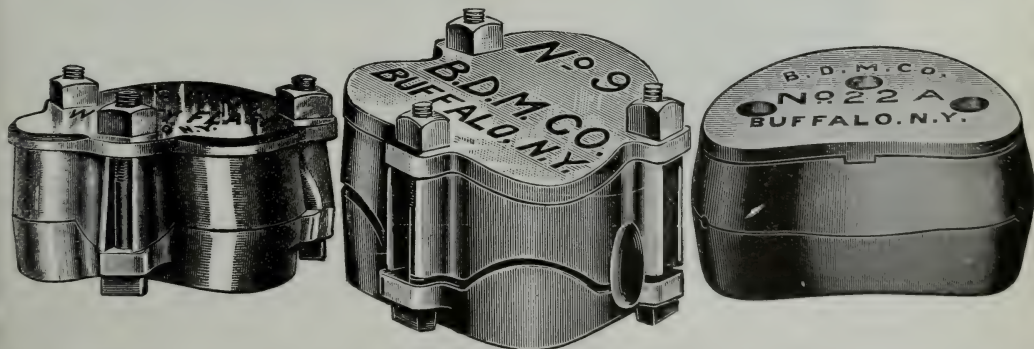
*Ask for Booklet No. 1*

Your Dental Dealer carries BUFFALO flasks in stock

**Buffalo Dental Manufacturing Co.**

**BUFFALO, N. Y., U. S. A.**

*Makers of the Lewis Cross Bar Vulcanizer*



# Ideal for Difficult Cases



Fig. 1

Showing the broken post

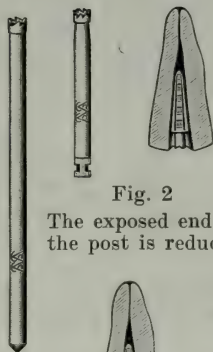


Fig. 2

The exposed end of the post is reduced

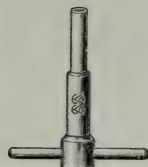


Fig. 3

A thread is cut around the reduced end of the post

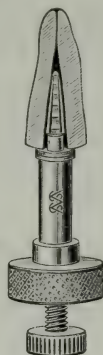


Fig. 4

A few turns of the larger thumb-nut after the Extractor is attached brings away the post



THE S. S. White Post Extractor not only removes protruding posts readily but it is especially effective in those difficult cases where the post is broken off short and does not protrude from the root (Fig. 1). Here it is unapproached; however firmly the post is set this extractor will ease it away and not weaken the root in so doing.

The operation is simple. The end of the post is reduced by a trephine as illustrated (Fig. 2). Two trephines are supplied, one for direct work and one for the angle handpiece.

By means of a thread die (Fig. 3) a thread is cut on the reduced post which exactly corresponds with a thread in the screw-socket of the extractor.

The extractor is then applied, turning the small thumb-nut (Fig. 4) which screws firmly on the threaded post.

Now a few turns of the large thumb-nut presses the tube against the root-end and thereby draws the post out precisely as several well-known forms of corkscrews lift the cork out of a bottle.

A rubber washer, backed by a metal one, against the body of the Extractor equalizes the pressure and prevents fracture of the root.

## The S.S. White Post Extractor

Set Complete in Case

**\$5.00**

*Your Dealer Will Supply You*

**The S. S. White Dental Mfg. Co.**

*"Since 1844 the Standard"*

Philadelphia

# THINK of it, Doctor—

**Ten Years of Popularity  
Because of Proven Efficiency**

## ADERER<sup>s</sup> No. 4

### PLATINUM-GOLD WIRE

**For Delicate Yet Strong Orthodontic Appliances**

No wonder so many so-called No. 4's are imitating the unapproachable original—Julius Aderer's No. 4. Order it always by its full name for your own protection. And here is your reason why: "Aderer's Products are Inseparably Linked with Satisfactory Results."

FOR OTHER  
APPLIANCES  
ADERER'S  
No. 1 WIRE  
WILL ANSWER  
VERY  
SATISFACTO-  
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#### ADERER'S STANDARD WIRE AND BAND MATERIAL FOR ORTHODONTIA

##### FEATURING "NOXIDIUM"

MANUFACTURERS  
OF ORTHODONTIC  
APPLIANCES SINCE  
1906; AND THE  
FIRST TO INTRO-  
DUCE PLATINUM-  
GOLD FOR USE IN  
ORTHODONTIA

Its efficiency for band material and wire, to entirely take the place of Iridio-Platinum, has been fully recognized by high authorities in Orthodontia. "NOXIDIUM" in wire form can be had in hardness equal to 25% Iridio-Platinum; the band metal equal to 10% Iridio-Platinum—both extremely tough.

##### "NOXIDIUM"

is infusible except in the oxyhydrogen blow-pipe.  
Insoluble except in Aqua Regia.  
NON-OXIDIZABLE under any condition.

*Price lists upon request*

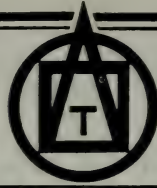
## JULIUS ADERER, Inc.

*Manufacturers*

MAIN OFFICE  
47 West 42nd Street  
New York, N. Y.

CHICAGO BRANCH  
Marshall Field Annex Building  
For Convenience of Our  
Western Customers





*"An Undisputed Ascendancy"*

—Macauley

**W**HEN one of the great masters of language wished to express the extreme of power and influence attained by a people, he spoke of their having reached "an undisputed ascendancy."

If he were describing the most beautiful denture restorations today he undoubtedly would have used the same terms in speaking of



When the leading prosthetic specialists and general practitioners of the world want artificial teeth of "undisputed ascendancy," they always order Trubyte Teeth. Their example is worth following.

YOUR DEALER WILL SUPPLY YOU

THE DENTISTS' SUPPLY COMPANY OF NEW YORK  
SOLE MANUFACTURERS OF TRUBYTE TEETH  
220 WEST 42<sup>ND</sup> ST. NEW YORK



# Which is Right

## in a dental cleanser?

*Should a tooth paste be alkaline or acid?*

Soap makes tooth pastes alkaline. Pepsodent omits alkalis, as well as chalk—it is acid in reaction. Most modern authorities agree with Dr. Pickerill that a tooth paste should be acid.

### How Pepsodent acts

Pepsodent contains pepsin.

The acid reaction multiplies the salivary flow and reduces its viscosity.

It multiplies the ptyalin in the saliva—the starch digestant—to dissolve the starchy particles which cling.

It multiplies the alkaline content of the saliva to neutralize mouth acids. And it maintains that excess long.

It applies a polishing agent, unique and efficient, to directly attack the plaque. Also to keep the teeth so highly polished that plaque cannot readily cling.

*If these results are right and necessary, the ordinary results are wrong.*

**Pepsodent** PAT. OFF.  
REG. U.S.

*The Modern Dentifrice*

**An efficient plaque combatant  
which complies in all ways with  
the best dental opinion.**

### Baseless objections

Millions now use Pepsodent. Most people daily see its good results. And there is no objection which is not disproved.

The acid does not harm teeth. We have kept natural teeth immersed for four years in Pepsodent mixed with saliva.

The polishing agent does not scratch teeth. It is tricalcic phosphate, finely powdered, sifted through a 200-mesh.

We have brushed natural teeth with it in our laboratory 250,000 times. It has been applied under pressure to both teeth and gold to equal years of ordinary brushing. Five years have proved it the ideal polishing agent.

If you do not know Pepsodent, ask for a tube to try. With it will come all the facts and the formula. Test it on your own teeth or at your chair. It is highly important to know the truth about Pepsodent.

THE PEPSODENT COMPANY, 465  
6305 Ludington Bldg., Chicago, Ill.

Please send me, free of charge, one regular 50c size tube of Pepsodent, also literature and formula.

Name .....

Address .....

Enclose card or letterhead

# Synthay Sylikay!

## A Master Silicate



Developed and perfected by  
N. K. GARHART, himself

No Royalties to Pay!  
80% More Powder!  
100% More Liquid!

A MASTER in proven  
QUALITY!

A LARGE reduction in PRICE!

We point with pride to its RE-  
MARKABLE selling record!

### 14 Standardized Colors

Single-color complete package ..... \$3.50  
6-color complete package ..... 15.00

*Write for Catalog—Mailed Upon Request*

#### MEDIUM



60% SILVER

#### P. S.

Post Script—PERFECTLY SOUND essentials are always PERFECTLY SAFE investments. "GARHART" alloys and other products are fully covered with a GUARANTEE of THIRTY YEARS of experience.

"Past Masters" in compounding "Plastic Materials" from "Pure Materials." These Products, "Made by N. K. Garhart, himself," are remarkable for their TOOTH CONSERVING value.

#### PRICES:

5 ozs. ... \$12.00	10 ozs. ... \$22.00	25 ozs. ... \$50.00
Cash ... 11.40	Cash .... 21.00	Cash .... 47.50

Filings or Shavings

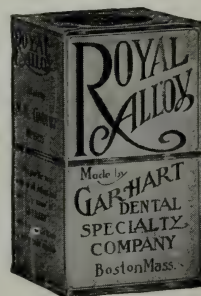
## Garhart Dental Specialty Co.

Somerville, No. 42, Mass.

Also direct service from Los Angeles,  
Cleveland and New York City

WRITE TO US!

#### BALANCED



67% SILVER





## Making Gold Inlays



Prepare cavity same as for cast gold inlay, being careful to parallel walls so that the inlay may be easily removed. Burnish matrix of pure gold, forty gauge, into cavity. The object of this matrix is merely to act as a basket or carrier by means of which the plastic filling may be removed from the cavity to the annealing tray. Absolute accuracy in the burnishing of this matrix is unnecessary, as when the plastic gold is packed into the cavity it will act as a swager and will burnish the matrix to position. Pack cavity half full of Amalgold, using as much pressure as possible. With the pliers, and by means of the matrix, the Amalgold may now be removed and placed upon the annealing tray and fired carefully and slowly (see directions). Replace the half completed inlay into the cavity and burnish thoroughly toward margins. If there is any slight porosity or distortion the burnishing will remove it. One of the virtues of Amalgold is that it still remains more or less pliable after it leaves the fire. This is then taken up by the burnishing, which leaves a hard, dense mass, but the advantage of this pliability is that it permits re-adaptation of the filling after it is placed into the cavity, and that after it has been burnished it is hard and dense enough to withstand any normal stress of mastication. More plastic Amalgold may now be added to the inlay, building up to occlusion, and it may be carved or the patient may be permitted to bite into the mass. Moisture does not affect it. Again remove the inlay and again fire. Replace into cavity and again burnish toward margins. In a large cavity it may be necessary to make more than two, perhaps three or four, applications of plastic gold, firing and burnishing after each application. The number of applications depending wholly upon the size of the cavity, and here experience and judgment may guide you. Perfect technique is essential for perfect results.

*Send for New Illustrated Technique*

**DENTAL PRODUCTS COMPANY**  
623 SOUTH WABASH AVE. CHICAGO, ILL.

# Keeps Partial Plates Firm After Extractions

**P**ATIENTS wearing partial plates who have had extractions made preparatory to the fitting of a new denture, will welcome the comfort made possible by sprinkling the partial plate with Dr. Wernet's Powder [White].

Dr. Wernet's Powder [White] will keep the partial plate in place until the new denture is finished.

Dentists attending the National Dental Convention held in Boston, who learned of this use for Dr. Wernet's Powder [White] more than welcomed the suggestion.

When you have work to do on patients wearing partial plates, use Dr. Wernet's Powder [White] to make the old plate adhere until new one is ready.

Put Dr. Wernet's Powder [White] to a strict comparative test for color, taste, odor and adhesive qualities and you too will credit it with superiority in every particular.

## Dentists are Using Dr. Wernet's Powder [White]

To eliminate bite plate troubles when trying out for lines of expression and making face bow measurements.

To keep wax trial plates in place.

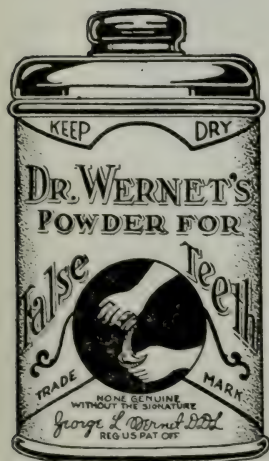
To prevent cotton rolls from sliding and slipping.

On old plates after changes have been made in them.

On new plates which, due to the insistence of the patients, have to be fitted several days after extractions.

On temporary plates.

On plates for flabby ridges.



H. R. LATHROP & COMPANY, Inc.

116 Beekman Street

New York, N. Y.

*Sold by Drug Stores, Department Stores and Dental Supply Houses*

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## *Facing for Artificial Dentures*

The ambition of every dentist is to get a facing for artificial dentures that will look as near as possible like natural gum. Something permanent, that is easily applied and will stand the acids of the mouth.



is applied after the plate is finished, requiring no vulcanizing nor polishing, is stronger than rubber, and has the appearance of continuous gum.

**Thompson  
Compound, Inc.**

Manufacturing Chemists

**Rochester  
N. Y., U. S. A.**

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Get a box from your nearest dental supply dealer, and be convinced.

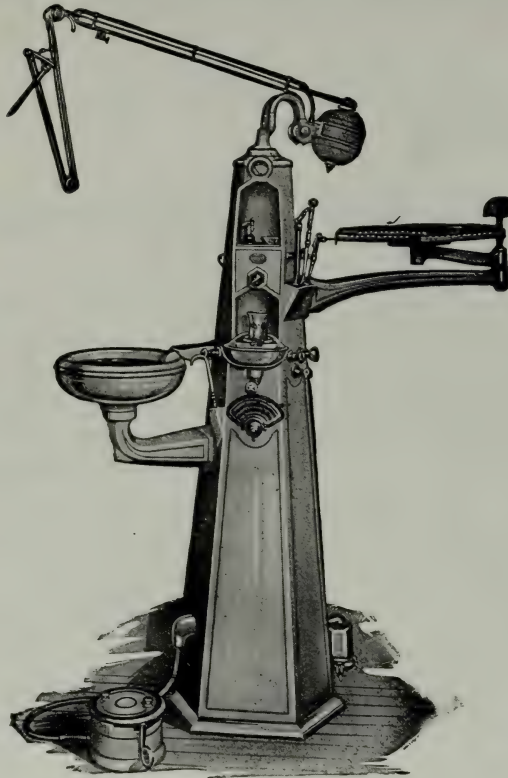
Each \$5.00 package contains sufficient Compound for several cases and full directions for use.

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# SIX MINUTES



## CLARK UNIT PEDESTAL

"It required just exactly six minutes to set my new CLARK UNIT over the outlets in my office, connect all of the unions and place it in operation throughout."

So wrote one Dentist who had set aside a complete afternoon for his Unit installation.

The open panel system of the CLARK UNIT, as it is built today, makes such ease possible and makes unobstructedly accessible the entire roomy interior with its simple new system of automatic pulleys and other pronounced modifications

**A. C. CLARK & CO.**

1035 E. 76th Street      Grand Crossing      Chicago, Ill., U.S.A.

# Facing Hints

## *Cutting the Backing Plate*



**A**FTER the Facing has been ground for the backing, it should be thoroughly cleaned, say by boiling lightly in soda solution. This to insure that its surface carries nothing to interfere with the fit of the backing, no organic substance to carbonize in the soldering heat.

It is sheer waste of time, energy and gold to cut individual backing plates out of the sheet; the frequent handling will harden the sheet, entailing much unnecessary annealing. Better cut off a strip wide enough to accommodate the length of the average facing,—11 mm. is an excellent working width for many cases; extremely long backings can be cut lengthwise of the strip.

After the strip is cut it should be rolled around a lead-pencil. In this form it is more readily annealed, more

conveniently handled, and less apt to be stiffened by unnecessary manipulation, as only enough of the strip is unrolled to cut the backing-plate for one Facing at a time. By following this plan the hardening and stiffening of a considerable piece of gold plate, with the necessary frequent annealing, will be avoided, and the getting-out of the backings will be greatly facilitated. For example, in the punching of the holes for the tooth-pins, which is the next step, the rolled end forms a perfect handle, enabling you to place the holes exactly before cutting off of the strip.

S. S. White Pointed-Pin Facings punch their own holes through the lighter backing-plates, up to No. 36 gage, and they afford the dentist a complete range of forms and sizes in natural shades.

## **S. S. White Pointed-Pin Facings, each \$0.45**

*For Sale by Dealers and at our Houses*

**The S. S. White Dental Mfg. Co.**

*"Since 1844 the Standard"*

**Philadelphia**

**New York**

**Boston**

**Chicago**

**Brooklyn**

**Atlanta**

**San Francisco**

**Oakland**

*Our Booklet No. 1880 shows the complete line of S. S. White Pointed-Pin Facings, and gives details of a sound technic for building bridges. Free for the asking.*



# The Dental Profession

In its daily use of our precious metal products, constitutes the best clinic any manufacturer can have. Its members work without bias; the findings of one are checked by the many. What we

get is not an individual opinion, but a consensus of the best opinion the profession affords.

Scientific manufacture is our field; scientific use of materials is yours. We make

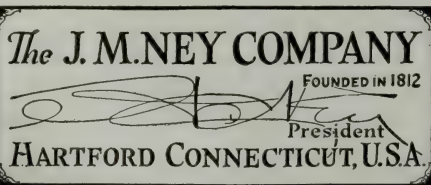
## Ney-Aloy

following the established formula approved by dental experience — practically the Black formula.

The alloy is made, packaged and priced the Ney way.

1 oz. \$2.25 ; 5 ozs. \$10.00

IF YOUR DEALER CANNOT SUPPLY ANY ARTICLE OF OUR MANUFACTURE, WRITE TO US





# Just Say

## "White's 1400 Assortment of Paper Disks"

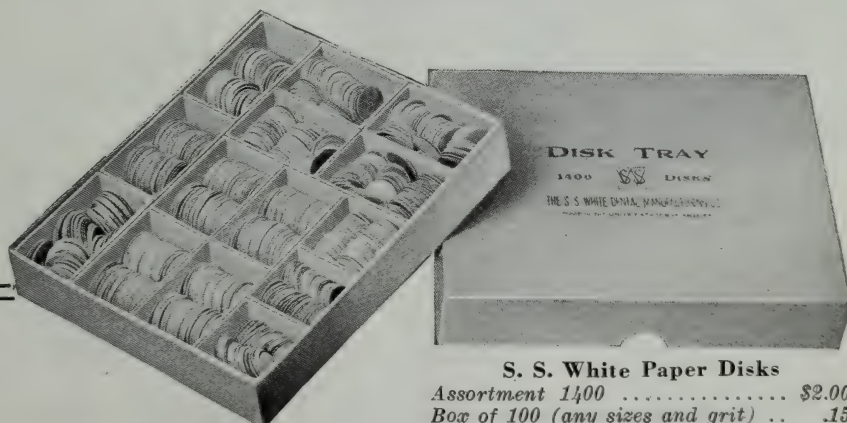
**Y**OU will receive a carefully selected assortment of good disks; all usable grits in desirable sizes. We make up the quantities and variety from a knowledge of their comparative popularity and usefulness.

Paper disks are among the inexpensive items that are used in great numbers, but for the very reason of their extensive use they should be as good as possible—which means they should be perfectly circular, without ragged edges, with holes accurately centered, and with grit that "stays on."

Don't waste effort and time on poor disks, especially when efficient disks may be had for little money.

*Your Dealer Will Supply You*  
**The S. S. White Dental Mfg. Co.**  
*"Since 1844 the Standard"*  
**Philadelphia**

*Send for handsome sample card of Disks and Strips*



**S. S. White Paper Disks**  
 Assortment 1400 ..... \$2.00  
 Box of 100 (any sizes and grit) .. .15

# PROPHYLACTIC TOOTH POWDER

Prophylactic Tooth Powder will thoroughly cleanse natural teeth and disclose the natural beauty and polish of uncoated enamel. Likewise, it will render artificial dentures and regulating appliances as clean and polished as when leaving the laboratory.



## ETHICAL

Its ingredients are open to public inspection.

## SCIENTIFIC

Because its production is the result of 37 years of continuous research in the field of preventive dentistry by Dr. M. L. Rhein.

## EFFECTIVE

Because its action is due to a mixture of organic salts with alkaline agents, producing an impalpable powder, in which acid activity immediately removes the Mucin Plaque. This acidity is quickly neutralized and replaced by an alkaline reaction so quickly that all danger of decalcification of the enamel is avoided.

This can be tested by mixing the powder with water and inserting a piece of blue litmus paper, which will at once turn pink. This color will immediately begin to fade and soon return to a deep blue color.

We use no salesmen. See that your druggist keeps it in stock.

## SAMPLES

Samples will not be indiscriminately distributed, but any reputable dentist may have one by making request by mail.

### PRICE

Per dozen .....	\$6.00
Per gross .....	66.00
Single can .....	.75
To any address in the United States	

Patented United States  
March 15, 1919

Patented Canada  
August 12, 1919

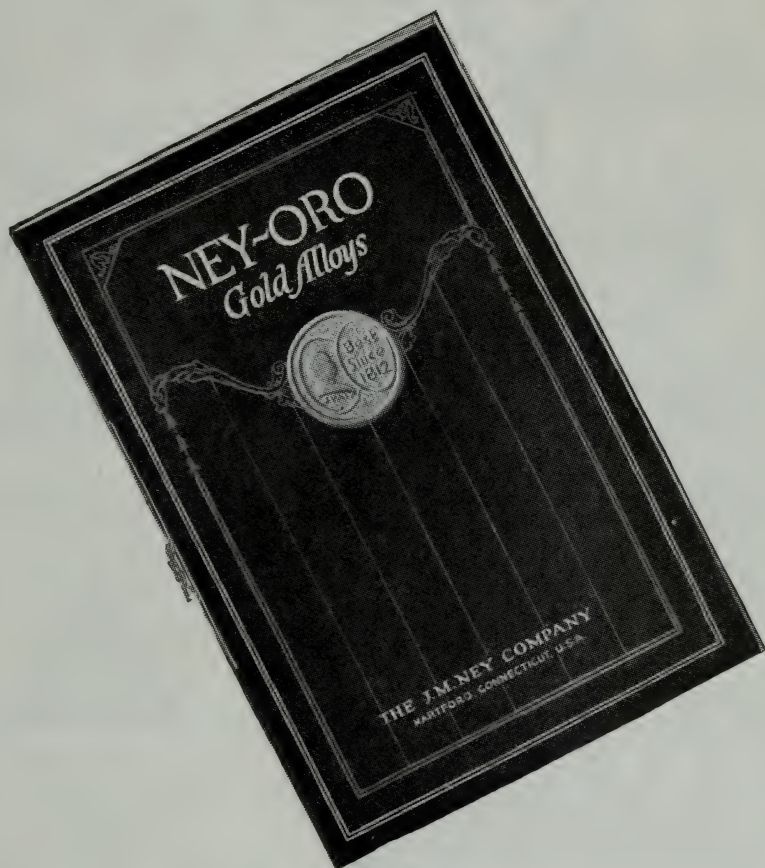
**PROPHYLACTIC TOOTH POWDER, INC.**

38 EAST 61st STREET

NEW YORK CITY



*They're Going Fast*  
*Do you want a Copy?*

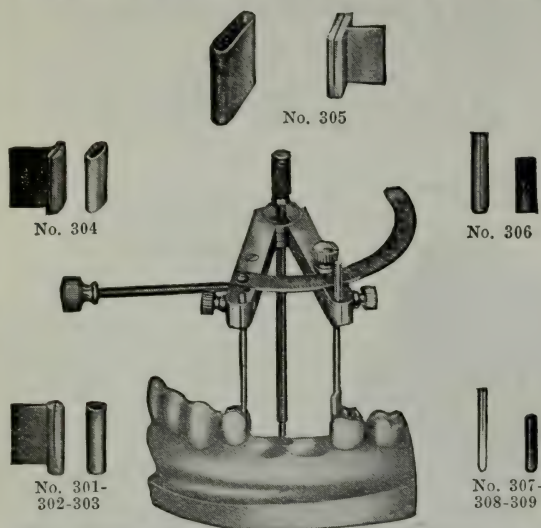


Requests for this book almost exhausted the edition by the time it was off the press. There are a few more dentists whose work is of a character to make this book indispensable for inspiration and for reference.

*They have only to request it to receive it*



# Removable Bridgework



without devitalizing or mutilating abutment teeth.

A paralleling instrument and attachments of sufficient merit to be recognized as standard.

## The Brown-Maier Parallel-Meter and Brown Attachments

two of the



*At Dental Supply Houses  
Everywhere*

Write for Booklets Nos. 20 and 12

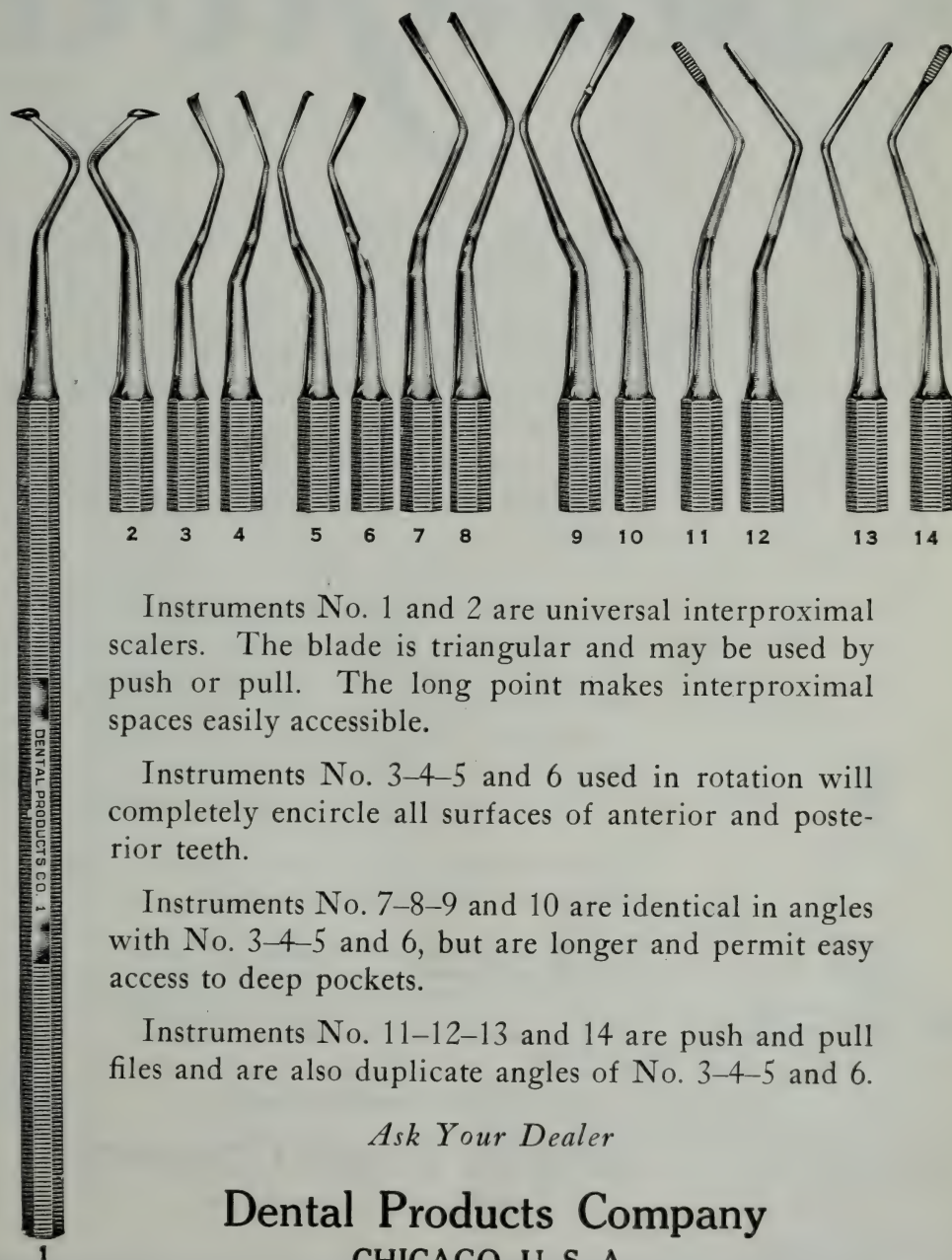
**The Parallel-Meter and all attachments  
are ready for immediate delivery**

## Columbia X-Ray & Electric Corp.

Austin Place and East 144th St.

New York City

# Scalers Files



Instruments No. 1 and 2 are universal interproximal scalers. The blade is triangular and may be used by push or pull. The long point makes interproximal spaces easily accessible.

Instruments No. 3-4-5 and 6 used in rotation will completely encircle all surfaces of anterior and posterior teeth.

Instruments No. 7-8-9 and 10 are identical in angles with No. 3-4-5 and 6, but are longer and permit easy access to deep pockets.

Instruments No. 11-12-13 and 14 are push and pull files and are also duplicate angles of No. 3-4-5 and 6.

*Ask Your Dealer*

**Dental Products Company**  
CHICAGO, U. S. A.

# Zhongiva

THE late Dr. D. D. Smith, of Philadelphia, was so far ahead of his day that his theories and methods were received with scepticism, but the profession has been compelled to admit that he was right and has adopted the practices which were previously ridiculed.

For example, his treatment of pyorrhea with zinc chloride was considered a mere fad. Now dentists are unanimous in the use of zinc chloride. Dr. Smith made zinc chloride agreeable both to taste and smell in his preparation — Zhongiva — which has an alcoholic content of 36%.

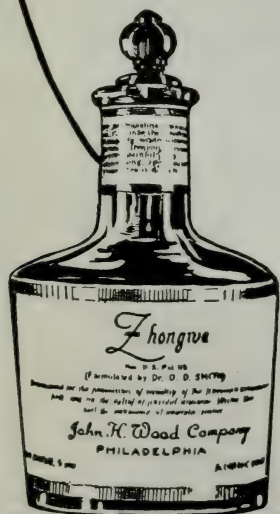
Zhongiva can be secured from your druggist or dental supply house.

*Zhongiva is used in treating pyorrhea, receding and spongy gums, gingivitis, acute inflammatory conditions, erupting wisdom teeth, sore tender mouths, after extractions and for teething children.*

Now Manufactured by

**John H. Wood Company**

126 Market Street, Philadelphia





# The hole in the pocket

**H**OW a man hates a hole in his pocket! He doesn't stand for it long after he has found it. But he usually finds it by losing something. That's the rub.

The expense account of conducting your practice has a pocket. Perhaps it has a hole in it. Perhaps the force of habit keeps you from finding it.

If you are buying Smith's Copper Cement a box at a time, you have a hole in the pocket of your expense account.

For, when you will have bought six boxes, a box at a time, you buy one which you would not otherwise have to buy.

Just have a look at the Six Color Box of Smith's Copper Cement, retailing at \$10.00.

It contains six big bottles each of powder and liquid, which, if purchased separately, would cost you \$12.00.

The difference represents a saving of 20% on your investment.

And the big box contains a bone spatula which is offered as an extra inducement, if any extra inducement is needed.

You are using Smith's Copper Cement day in and day out.

It is the ideal cement for setting crowns, bridges and inlays, as well as for general fillings.

The eight shades in which it is made may be assorted in any way you wish.

**Lee S. Smith & Son Manufacturing Co., Pittsburgh, U. S. A.**

## —and the moral



## No Wonder She Smiles

Patients and dentists alike are proud of inlays made with

### J E L E N K O ' S S P E C I A L I N L A Y C A S T I N G G O L D

Not only does it cast perfectly, with sharp, true margins, but it polishes so satisfactorily, from the standpoint of the patient.

Any dentist can safely entrust his reputation of Inlay Work to the sterling qualities of JELENKO'S GOLD. It is harder than pure gold. Contains an alloy which prevents its flowing under stress.

Jelenko's Special Inlay Casting Gold .....per dwt. \$1.20



## Other Jelenko Casting Golds are

Jelenko's 18 and 20 Kt. Casting Golds for plate, bridge and saddle work. Dense, non-porous, light yellow in color. Remarkable tensile strength. •

18 Kt. Casting Gold .....per dwt. \$1.00

20 Kt. Casting Gold .....per dwt. \$1.10

Jelenko's No. 5 Casting Clasp Gold, for strong, springy clasps, finished in platinum color. Contains high percentage of Platinum and Palladium. Fusing point 1950° F.

Price .....per dwt. \$2.50

Jelenko's No. 6 Casting Clasp Gold, for clasps. Just as strong and springy as made with No. 5, but finished in gold color. Contains 5% Platinum. Fusing point 1760° F.

Price .....per dwt. \$1.65

If you believe in specialized products for special needs, you will become a user of Jelenko's Golds.

*An interesting booklet, "How to Cast," will be sent you upon request*

Most Dealers carry Jelenko's Casting Golds. If your's cannot supply you, write direct to us.

*Manufactured by*

**J. F. JELENKO & COMPANY**

*Manufacturers of Dental Gold and Solder*

1 Union Square

New York, U. S. A.



## Individually Inspected

When the excellence of the instrument itself is a vital factor in the success of an operation, the importance of inspection cannot be over-estimated.

The manufacture of S. S. White Pulp-Canal Cleaners is a series of operations in machines that are automatic—machines that work with microscopic accuracy, with a precision impossible to duplicate by the human hand.

Mechanical devices for testing the toughness and spring-temper of the steel wire eliminate guess work in selecting the material.

Chemical and electrical tests make possible the maintenance of uniformity in the composition of the steel and furnish a further check for imperfections. Nevertheless, the trained eye of an expert is invaluable in intermediate and final inspections and just before sealing in the packages each S. S. White Pulp-Canal Cleaner is examined under the magnifying glass. That is why you have found them reliable.

### S. S. White Pulp-Canal Cleaners

Per gross . . . . .	\$8.00
Half gross . . . . .	4.50
Dozen . . . . .	.80

*Your Dealer Can Supply You*

**The S. S. White Dental Mfg. Co.**

*"Since 1844 the Standard"*

**Philadelphia**





# **“Your Professional Success Rests On the Patient’s Confidence”**

The responsibility to your patient in displaying an office equipment to confidence-creating advantage, is no less important than supplying yourself with the most modern instruments, devices and professional appointments.



No. 510—Open

The Public have been educated to the fact that Modern Dental Equipment is built along Aseptic-Sanitary lines and which effect to a selected clientele, means more than dollars and cents.

Why not cement that confidence with a Pressed Steel Cabinet, which presents the most progressive thought in appearance, lasting qualities, utility and cleanliness? A Postal Card will bring catalog and price list.

*“Sold Through all Good Dental Depots”*

**The Columbus Aseptic Furniture Company**  
**COLUMBUS, OHIO**

# Meeting With Instant Approval

In the offices of busy dentists where time is precious and every effort is made to save labor

## *Masel's Seamless, Ready-Made Gold Crowns*

are meeting with approval. Not only are time and labor saved, but also the price of scraps that you ordinarily lose in swaging. Now compare these features with the cost and convenience of Masel's Seamless Ready-Made Gold Crowns. This comparison has created a demand that is growing steadily—over thirty dental depots now selling them in the United States and Territories.

Masel's Seamless Ready-Made Gold Crowns are made of 22k, 30 gage gold in an assortment that will meet every requirement. Contain no solder but can be filled with solder of any make or karat.

### PRICES (Any Number)

C . . .	\$1.00	E . . .	\$1.35
D . . .	1.20	F . . .	1.50
G . . .	\$1.75		

If your dealer doesn't carry them, write us for nearest depot, or to save time, order direct. Orders are filled the day received.

## Masel Dental Laboratory

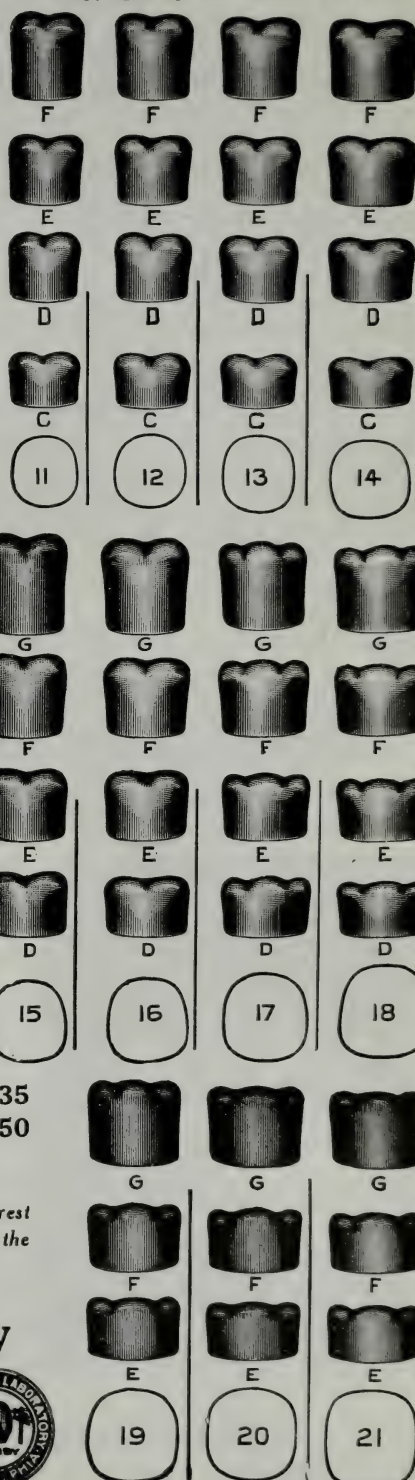
214 S. Twelfth Street  
Philadelphia

Send for Complete Catalog



## Lower Molars

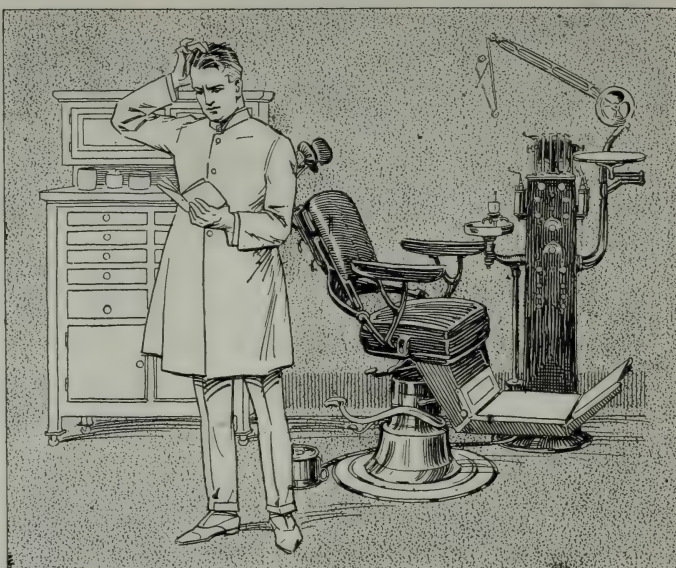
(Copyright by Isaac Masel 1918)





This picture represents the hit-and-miss Dentist who is keen to improve his professional technic, but neglects the business side, feeling that on account of his doing his work so well, the fees would take care of themselves and when the year is over, he doesn't know what has happened except he knows there is not enough to care for his needs, let alone comforts, pleasure and the future.

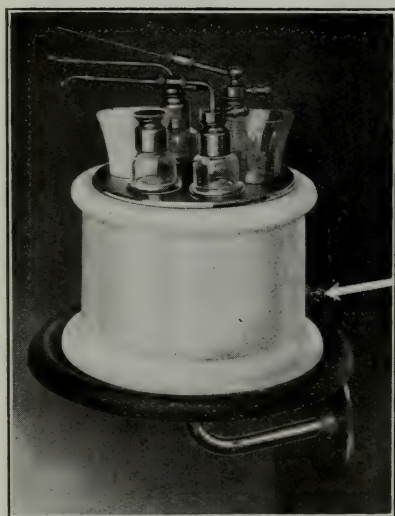
The Bosworth Efficiency System will relieve you of these worries and makes it possible to end up the year with a surplus for all needs.



### SPECIAL OFFER

In order to prove up the increased earning possibility, we will, for \$20.00, send you the part of the System that increases earnings, feeling that when the improvement takes place, you will want the entire System.

Write for the names of Dentists who are using this System.



### Bosworth Spray Heater and Bracket Outfit

"Spray out every Mouth"

It is good practice and good psychology.

The colored bulb in our heater will heat the bottles and water glasses and by diffusing a soft glow through the opalite shell, makes the outfit very attractive.

The Bracket provides a definite place for the heater, which can be installed in view of the patient and within easy access of the operator.

Bracket made in Mahogany, Gray or White.

Price of Heater ..... \$18.00

Price of Bracket ..... 4.50

## HARRY J. BOSWORTH COMPANY

Tower Building

Chicago, Ill.



# Positive Results Assured

*when you use*

## L-F Coolidge X-Ray Units

### Model 530—\$960

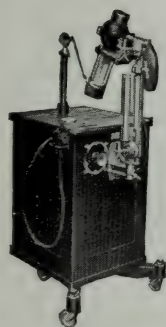
See illustration below  
at right

*30 M. A., Variable Gap, 3 to 5"*

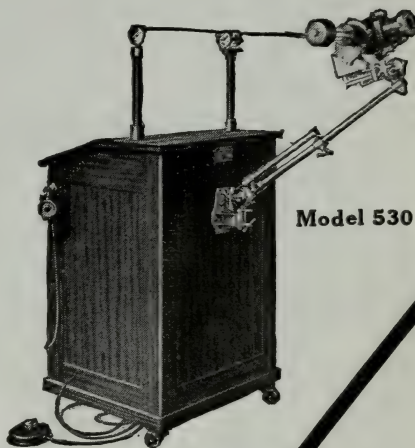
Expressly adapted to needs of the oral surgeon, who requires films or plates of the frontal and maxillary sinuses as well as intra-oral films; or for installations where both dental and routine medical work is to be done. Fully counterbalanced tube holder. Capable of doing all radiographic work, including chest, stomach and intestinal tract. Equipped with magnetically operated exposure switch and combination cone.

### Model 310—\$650

*10 M. A., 3" Gap*



Expressly adapted to strictly dental radiography, having the advantages of the right angle Coolidge Tube. Especially easy and rapid adjustments for intra-oral work; fully counterbalanced tube holder; the complete equipment very compact and easily moved about. Can be operated either with patient in dental chair or separate chair. Operates off ordinary light wiring.



**Model 530**

Both outfits are equipped with the L-F automatic switch, which makes possible the accurate timing of all exposures, insuring uniformity of results.

## The Liebel-Flarsheim Co.

420 Home Street  
Cincinnati, O., U. S. A.



The Plant Behind  
the Product

Manufacturers of X-Ray Apparatus for the Dentist, General Practitioner, and X-Ray Specialist. Distributors for the General Electric Co., Portable Coolidge X-Ray Outfit.

THE LIEBEL-FLARSHEIM CO.  
CINCINNATI, O.

Please send me, without obligation, further information on Model .....

I have .....volts direct current.....  
volts.....cycles alternating current.

Dr. ....

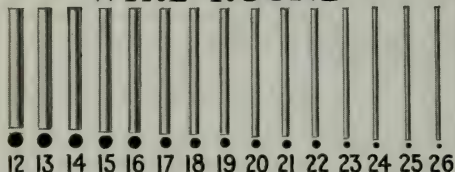
City .....

State .....

# Clasp Metals

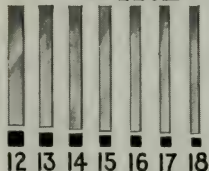
Two fine gold alloys in plate form, strips and wire (round, half round, oval, and square). Always reliable as to accuracy of sizes and as to uniformity in working characteristics.

## WIRE-ROUND



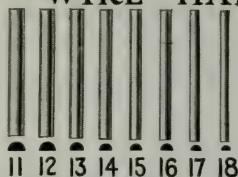
B.&S. GAUGE

## WIRE-SQUARE



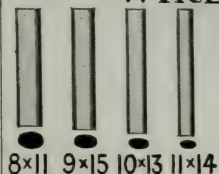
B.&S. GAUGE

## WIRE - HALF ROUND



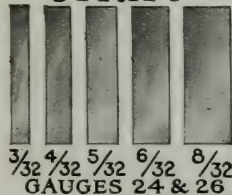
B.&S. GAUGE

## WIRE - OVAL



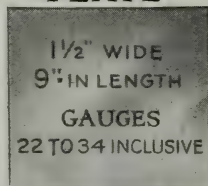
B.&S. GAUGE

## STRIPS



No. 1. CLASP BAND MATERIAL

## PLATE



SIZES IN  
.006 X .170 .003 X .180 .006 X .200 1/1000 INCH

## S. S. White Clasp Metal No. 1

a gold and platinum alloy

For lingual bars, crown-posts, strengthening bars, bridge construction, whether soldered or cast, clasps and fixtures or any application where a non-corrodible, tough, springy metal of the highest grade is needed.

## S. S. White Clasp Metal No. 3

a fine gold alloy of a rich color

For all purposes in which a high grade, non-corrodible, tough, springy gold alloy is wanted in soldered work; for strengthening bars, clasps, crown-posts.

These and other gold materials—shells, disks, solders, plate and wire are described and much useful information is contained in a new booklet—"Uncompromising Gold for Prosthetic Dentistry"—mailed free anywhere.

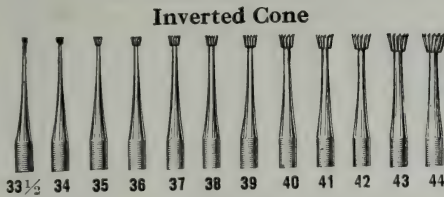
The S. S. White Dental Mfg. Co.

*"Since 1844 the Standard"*

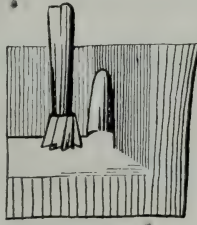
Philadelphia



## Clev-Dent Burs At Prices That Have An Ante Bellum Sound



The formation of convenient points for starting a gold foil restoration is one of the many good services daily performed by inverted cone burs, a form that is, perhaps, the most generally useful of all the forms in which burs are made.



CLEV-DENT BURS accurate, clean cutting, and correct in temper, are now offered to the profession at a decided reduction in cost. The quantity rates and price of the *Complete Assortment* are especially attractive.

The COMPLETE ASSORTMENT of Clev-Dent Burs includes two gross of excavating and one gross of cross-cut enamel burs with a sterilizable metal bur case. Its price is \$33, a saving of \$16.50, or 33 $\frac{1}{3}$ % of the cost of the separate items. The burs in this assortment cost \$0.91 $\frac{2}{3}$  per dozen.

### Price Savings on Quantity Lots

		Dozen price	Saving on Quantity
EXCAVATING BURS $\frac{1}{2}$ to 7, 11 $\frac{1}{2}$ to 18, 33 $\frac{1}{2}$ to 40, 55 $\frac{1}{2}$ to 60, 68 to 73, 457 to 462	1 dozen	\$1.25	
	$\frac{1}{2}$ gross	1.09	\$1.00 or 13%
	1 gross	1.00	3.00 or 20%
	2 gross	.92	8.00 or 26%
	3 gross	.84	15.00 or 33%
EXCAVATING BURS 8 to 11, 19 to 22, 41 to 44, and ALL CROSS-CUT ENAMEL BURS	1 dozen	1.50	
	$\frac{1}{2}$ gross	1.34	1.00 or 12%
	1 gross	1.25	3.00 or 16%
	2 gross	1.17	8.00 or 22%
	3 gross	1.09	15.00 or 27%

*The Clev-Dent Catalog of Engine Equipment, Operating Instruments, etc., and a folder describing the "Complete Assortment" of Clev-Dent Burs will be sent on request.*



THE CLEVELAND DENTAL MFG. CO.  
CLEVELAND, OHIO, U. S. A.



# What does dead-burned mean?

**C**EMENT powder can be *dead-burned* by faulty calcination. Reaction with the liquid then becomes sluggish and lifeless. The cement goes into the mouth overloaded with weak, dead-burned waste



**CAULK CEMENT**  
is all live and reactive. Every atom in the bottle is genuine cementing material

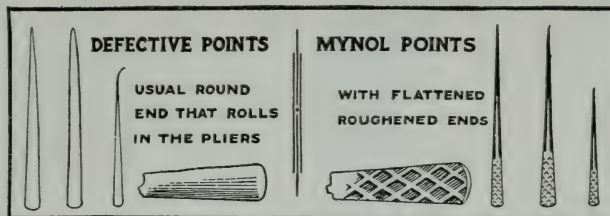


**GIVE YOUR PATIENTS THE BENEFIT**  
Adopt Caulk Cement for your practice

*Sold by all dealers*

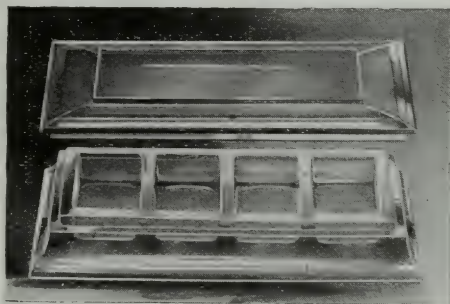
THE L. D. CAULK COMPANY : MILFORD, DELAWARE : TORONTO, CANADA

## Mynol Gutta-Percha Points



The profession has too long been "getting along" with cheap, imperfect, inferior points. *Mynol Points* are in a class of their own, beyond competition. They are made for the dentist who has pride in his work and scorns makeshifts. Every point is perfect, dense, tough, with proper taper, and with the *Mynol* patented flattened, roughened end.

In two lengths: A,  $1\frac{1}{8}$  inches; B,  $\frac{3}{4}$  inch. Extra fine, fine, medium, large or assorted.

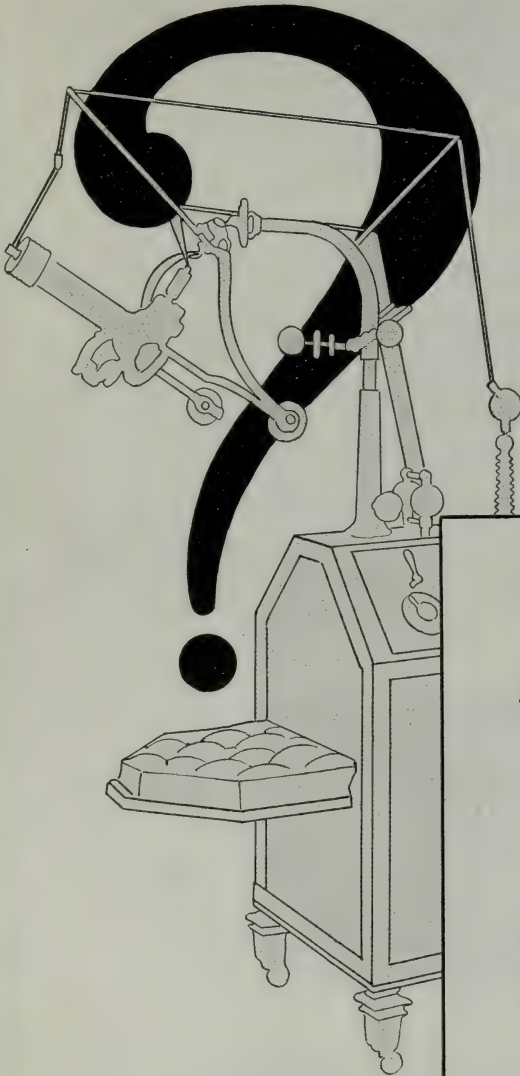


Particular dentists who wish to avoid all danger of infection will keep their points in a *Mynol Gutta-Percha Point Sterilizer* shown above.

*Further information from your dealer*

**THE MYNOL CHEMICAL COMPANY**

Real Estate Trust Bldg., Phila.



## COMING

*Fischer's Gift to the  
Dental Profession*

### A New Coolidge Dental Unit

A new model, embodying new ideas, giving the ultimate in X-ray facilities.

In the January issue of *THE DENTAL COSMOS* we will give you all the details.

The investment involved in the purchase of an X-ray Unit warrants your investigation of this new unit before purchasing.

**H. G. FISCHER & CO.**

2337 Wabansia Avenue  
Chicago, Ill.





# Attachments for Removable Bridgework

We illustrate here some specimens of attachments for removable bridgework manufactured by us. These are only a few of the many appliances made of precious metals we make. We offer our facilities for fine die-work to those interested in the production of articles of precision made of alloys of the precious metals.

Supplee Attachment With  
Adjustable Tension Spring

Made for  
S. G. Supplee & Co.



*Tension Spring*

Boos Split  
Tube and  
Post  
Attachment



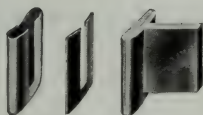
## McCollum Attachment

Made with Stress-Breaking Device Self-Contained

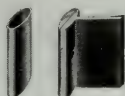


## The Brown Attachments

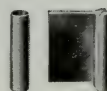
Made for Columbia X-Ray & Electric Corp.



*Flat-Curved*



*Oval*



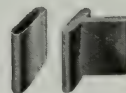
*Round (Made in 3 sizes)*



*Upright (round)*



*Split pin and Tube  
(Made in 3 sizes)*



*Flat*

**LEARN to ask for STERN**

*Literature on our line of Dental Gold Specialties on request*

**I. STERN & CO.**

104-106 West 116 Street

New York City

## THE NEW ENGELN DENTAL X-RAY UNIT



This new machine has solved every problem in dental X-ray work. The overhead arm has three *fixed* movements—perfect pictures are purely a mechanical process.

It is *safe* and as flexible as your dental engine arm.

We do not hesitate to say that *no Dental X-ray Outfit* on the market today can approach this scientific development.

Our new bulletin will interest you, whether you are in the market or not. Write for a copy.

**The Engeln Electric Co.**  
**4601-11 Euclid Avenue**  
**Cleveland, Ohio**

### BRANCHES

Philadelphia	Chicago	Pittsburgh
Schenectady	Detroit	Los Angeles

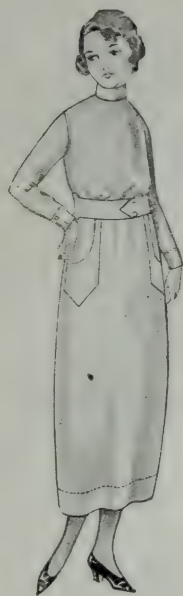
## *Perfection*

## Fleck's Perfected Cements

We promised **PERFECTION** when we offered Fleck's Cement to the Dental profession. After years of use under all conditions in the mouth, thousands of users verify our statement that **PERFECTION** has been reached in Fleck's Cements.

**J. R. STANLEY CHEMICAL CO.**

**1 Union Square, New York**



Style B

**Manhattan**  
PROFESSIONAL GARMENTS

Keep their newness and freshness always, because they are thoroughly pre-shrunk. No guesswork in buying Manhattan office dresses. They fit, and do not shrink in laundering.

MANHATTAN dresses, made of extra quality linen finish, Indian Head at

**\$5.00 EACH OR 3 FOR \$13.50**

[Order by size (34 to 46)]

Cost less than the un-shrunk kind and give satisfaction that won't wear off the first time they are laundered.

Made in a variety of pleasing styles

*Better order yours to-day*

**MANHATTAN COAT FACTORY, Inc.**  
DEPT. C, 3223 N. HALSTED ST. CHICAGO

Send for Samples and Literature

STRONGEST NEEDLES CLEANEST NEEDLES

## SCHIMMEL ASEPTIC DENTAL NEEDLES

Complete Asepsis Maintained

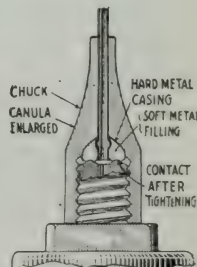
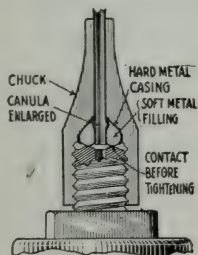
*Positively Non-Leaking All Metal Joint  
Without Washers or Packing*

The heads of Schimmel Needles are made of soft metal encased in hard metal on chuck side, but open on side next syringe.

### NOTICE

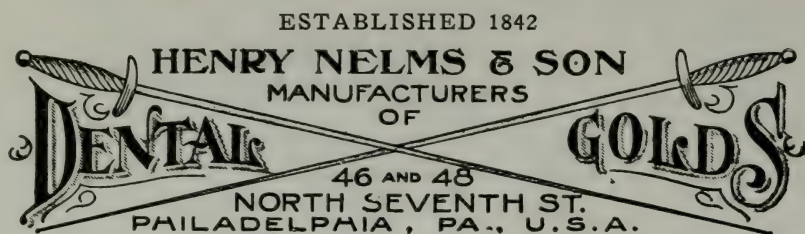
How this head spreads and fills every crevice when chuck is screwed down to place on syringe. An exclusive Schimmel feature. Hard metal casing prevents sticking in chuck.

*Beware of cheap foreign imitations*



*The Ransom & Randolph Company*  
TOLEDO, O. U. S. A.





WE ARE MANUFACTURERS OF DENTAL GOLDS

Thirty sizes and five lengths of each size of 22K Gold Shells; polished, numbered and cut to length.

A full line of Casting Clasp Golds, Gold Plate, Solders, Wire, Gold Cylinders, Gold Foil.

A complete line of Dental Metals for the mouth.

Alloys. Thirty Formulas.

We sell only what we manufacture.

**HENRY NELMS AND SON**

*BILL IN CONGRESS TO TAX GOLD \$10.00 PER OUNCE*

## Inflamed or Exposed Pulps

need not be necessarily attended by intense pain. In the interest of painless and conservative dentistry, the use of

### JODO-FORMAGEN CEMENT

has demonstrated, in its years of service to the profession, unequalled qualities in alleviating pain caused by inflamed or exposed pulps. Painless operations can be performed due to its qualities of quieting supersensitive dentine. An application of Jodo-Formagen is characterized by a drying up of secretions, granulation, and a quick, healthy restoration of the pulp chamber. Its germicidal powers permit the instant filling of a cavity without fear of future pain or inflammation after the exposed nerve has been capped with Jodo-Formagen.

Price for pkg. ....	\$2.00
" " double pkg. ....	3.00

The *IMPORTED* Jodo-Formagen Cement can be procured now at \$2.50 for Regular Size Package.

*(Please specify whether the Domestic or the Imported product is desired)*

**GUSTAV SCHARMANN**

1181 Broadway

New York, N. Y.

It is very generally known that normal saliva is alkaline and that where acid conditions of the mouth are found, they exist generally because fermenting food about the teeth produces more acid than the saliva can neutralize.

## **Dioxogen**

is unusually effective in correcting acidity of the mouth; it bubbles its way between the teeth, cleans out crevices, destroying germs and their products, checks fermentation and stimulates the flow of saliva.

Dioxogen helps to restore neutral and healthy conditions in the mouth.

**THE OAKLAND CHEMICAL CO.**

**59 FOURTH AVENUE**

**NEW YORK**

**Do Not Devitalize Teeth Simply Because  
They Have Extensive Caries**

**Use**

# **STERIDENT**

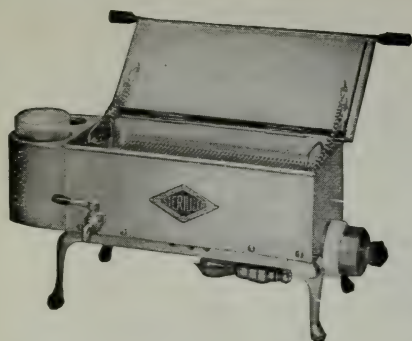
**"The Material That Makes Dentistry On  
Vital Teeth Possible"**

***Your Dealer Will Supply You***

**Prepared By**

**King's Specialty Company  
FORT WAYNE, INDIANA**





Study this Advertisement  
*Don't Merely Read It*



## THE HALVERSON NEW TYPE STERILIZER

Heating element and bevel-faced three-heat switch, are securely fastened to a metal reinforced bed plate — with Transite Heat Conserver — Brazilian mica insulation — Nichrome ribbon heat unit — asbestos-covered wire connections — and original safety features.

All specially designed for durability, service and quick action.

*Send for descriptive circular of different sizes and models*

### THE HALVERSON COMPANY

180 North Dearborn St.  
 CHICAGO, ILL.

Union Ave. at East Oak  
 PORTLAND, OREGON

## Infection Invariably Occurs—

when a root canal is not properly filled to its end. This is one of the most particular and difficult steps in dentistry.

Perhaps you would welcome an instrument that makes this operation less trying.

### KERR PULP CANAL PLUGGERS

are made in twelve sizes, scientifically designed, both straight and contra-angle which enables any root canal in the mouth to be reached with facility, insuring that your filling may be driven to the very root end.

*At all Dental Depots*

**Detroit Dental Manufacturing Co.**

Detroit, Mich., U. S. A.





## S. S. White "Tooth Tint" Temporary Stopping

*A new stopping that approximates the average shade of natural teeth*

S. S. White Tooth Tint Temporary Stopping has all the useful qualities of our well-known pink and white stoppings with the added advantage of being inconspicuous in the mouth. Especially indicated for cavities in exposed locations.

### S. S. WHITE TEMPORARY STOPPING

Three Colors—Pink—White—Tooth Tint

In Sticks—two sizes—1/8 and 3/16 inch

Full ounce box—one color or assorted ..... \$0.50

Six boxes, as selected ..... 2.40

Your Dealer Will Supply You

*Sample free on request to*

**The S. S. White Dental Manufacturing Co.**

*"Since 1844 the Standard"*

**Philadelphia**

## Novocain Service Through Your Dealer

Your dental house is prepared to give prompt and efficient service and will supply you from stock with

**NOVOCAIN-L-SUPRARENIN (N-S) TABLETS**

**"E" AND "T"**

and

**NOVOCAIN-L-SUPRARENIN (N-S) PLUGLETS**

at \$4.00 per box of 10 tubes, or \$35.00 per box of 100 tubes.

Insist upon the original product

**N O V O C A I N**

**(Procaine-Metz)**

which represents purity and quality to the nth degree.

**H. A. METZ LABORATORIES, Inc.**

**122 Hudson Street**

**New York**

## S. S. White Perfection Polishing Strips

Tough Fabric which stands the strains of polishing.  
The grit sticks to the fabric and to the work.  
Thin, exceptionally so; will go into any interspace.

### Made in Six Varieties

#### ABRASIVES

Carborundum—(medium)  
Emery—(coarse)  
Garnet—(very coarse)

#### POLISHERS

Lava—(fine)  
Flint—(very fine)  
Cuttlefish—(finest)

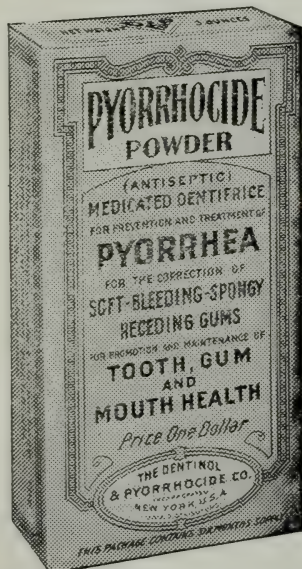
Six inches long—two widths:—Narrow 1/8 in., Wide, 3/16 in.  
Box (1 gross) separate or assorted—\$0.60

*Your Dealer Will Supply You*

THE S. S. WHITE DENTAL MANUFACTURING CO.  
"Since 1844 the Standard"  
PHILADELPHIA

## CAUSTICITY—PYORRHEA

The value of Pyorrhocide Powder in pyorrhea treatment is emphasized when it is compared with dental preparations which contain large quantities of soap, glycerine or other caustic properties



Causticity (like toxicity), however slight, must be avoided in pyorrhea work. The dentist aims to stimulate and encourage the growth of body cells and to heal and harden the diseased oral tissues rather than retarding their growth and softening them by caustic action.

Pyorrhocide Powder is non-caustic and non-toxic. It aids in repairing soft, bleeding, spongy gums. It keeps the gums hard and firm and it cleans and polishes the teeth.

There is no soapy or oily coating deposited on the teeth and gums when they are brushed with Pyorrhocide Powder.

Users of this dentifrice experience a true feeling of oral cleanliness at the time it is applied and for several hours thereafter.

**PRESCRIBE PYORRHOCIDE POWDER  
COMPARE RESULTS**

**FREE**

Free samples of Pyorrhocide Powder for distribution, a trial bottle of Dentinol for use at the chair and a copy of "Causes and Effects of Pyorrhea" mailed on request.

**The Dentinol & Pyorrhocide Co., Inc.**  
1480 Broadway  
New York

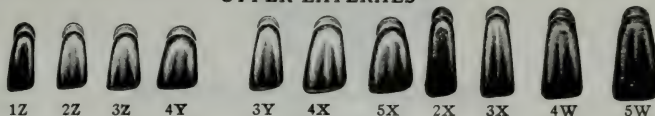




## Masel's Gold Facings for Bridgework



### UPPER LATERALS



### CUSPIDS



These Gold Facings, 22K, are splendidly suited for use where regular stock porcelain teeth will not answer.

There are cases where one porcelain tooth if used would appear abnormally large, while if two smaller teeth are taken they will look unnaturally small.

In such cases use a stock size porcelain tooth and fill out with one of these special gold facings and you have satisfactorily solved the problem.

These facings also have the added advantage of standing considerable stress which might cause the porcelain tooth to break. Being hollow, these facings are readily made narrower or wider, and the thick shell of gold is not likely to be burnt by solder as in the case of 30 gauge.

The Facings illustrated are actual size.

PRICES: Z, 55c Each. Y, 60c Each. X, 65c Each. W, 70c Each. U, 85c Each

*Order from your dealer*

*If he cannot supply you send your order direct to*

**Masel Dental Laboratory - 214 South Twelfth Street**

Philadelphia, Pa. U. S. A.

See Special Announcement on Seamless Gold Crowns, Page 59.



## LISTERINE

offers a definite, dependable service to the Dental Surgeon in his operative work. The care exercised in the manufacture of Listerine insures a uniformity in preparation which may be relied upon to produce like results under like conditions.

## LISTERINE

has an agreeable, refreshing taste, and this, combined with its well-proven antiseptic properties, makes it a most acceptable solution for use as a spray or wash prior to and after operations on the teeth or gums.

## LISTERINE

possesses a two-fold antiseptic effect. After evaporation, a film, consisting of boric and benzoic acid, with baptisia tinctoria remains on the surface to which Listerine has been applied.

A small quantity of Listerine evaporated from a watch glass, or other suitable container, will disclose a residue of these beautiful crystals in abundance, as Listerine is a saturated solution of boric acid.

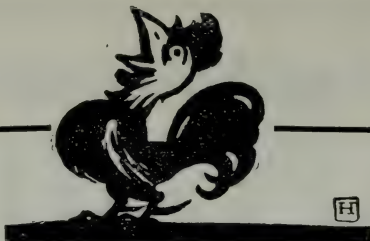
May we send a bottle of Listerine to your address, Doctor, for your observation and use?

**Lambert Pharmacal Company**

2101 Locust Street

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We Are Still Crowing About Our  
**Nesbett Removable Cast Clasp Bridges**  
 Made the Nesbett Way

*Refer to article October Cosmos by Norman Beverly Nesbett, D.M.D.*

CASTRITE METAL IS IDEAL  
 FOR THESE BRIDGES

*Send for descriptive booklet*

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# BREWSTER AMALGAM



IS A 67% SILVER ALLOY  
IT HAS NO SHRINKAGE  
IT HAS NO EXPANSION  
ITS CRUSHING STRENGTH

in pounds per square inch is 80,200

IT RETAINS ITS BRIGHT COLOR IN THE  
MOUTH TO A REMARKABLE DEGREE

*It Can be Obtained from any Dental Dealer in the Country*

Manufactured Solely by

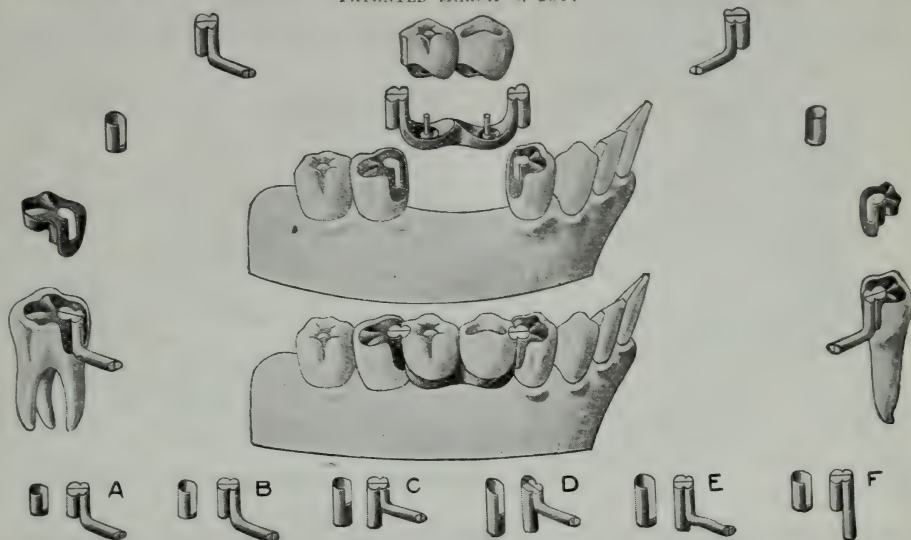
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Office: 159 N. State St. CHICAGO, U. S. A.

JOHN YIRIKIAN, Inventor and Manufacturer of  
**New Split Attachment for Removable Bridge Work**

PATENTED MARCH 6, 1917



New improvement in the split which is more practical and impossible to break  
 \$10 each, for all letter or number. Circular with instructions furnished

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## The Solution of Dental Plastic Problems

When you begin using Clover Leaf Plaster you'll find a solution to your previous plaster problems.

It does just what you expect a good plaster to do, and does it better than you ever had it done before.

So fine it is almost an impalpable powder,—it takes a sharp impression of the most intricate details,—sets dense and hard and beautifully white.

It is so nearly perfect in accurately reproducing, that you'll say there is not a particle of shrinkage or expansion.

Put up in two forms—XX, Quick setting, and X, Standard Set for Models.

A trial will convince the most skeptical, and we want you to make this trial at our expense. Send for sample of each, on coupon attached.

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*For-Sale by Dental Dealers*

**H. B. Wiggin's Sons Co.**

*Manufacturers*

**Bloomfield, N. J.**

*Western Office*

**160 Jackson Blvd.**

**Chicago, Ill.**



H. B. Wiggin's Sons Co.  
 Bloomfield, N. J.

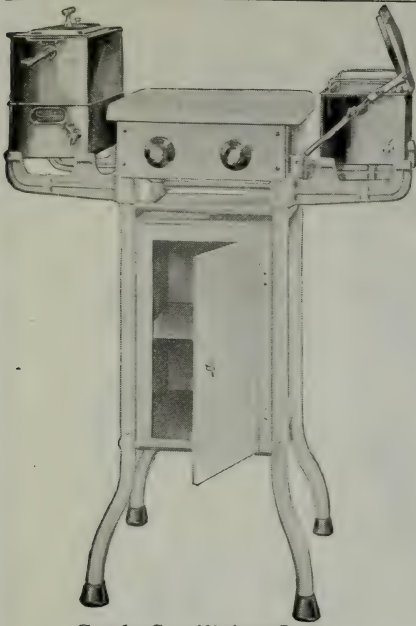
Gentlemen:  
 Please send me samples of Clover Leaf Dental  
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Dr. ....

Address .....

D. C.





Castle Sterilizing Outfit  
No. 1414 (Electric)

Instrument and Dressing Sterilizers mounted on special table. Compact, complete, and attractive.

## Castle Sterilizers

*"Used by progressive dentists everywhere"*

In the dental office of today,—there is no question of whether a sterilizer is desirable,—it is an absolute necessity.

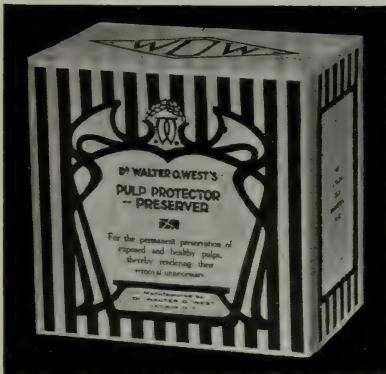
Years of manufacturing experience and a full appreciation of the daily needs of the dental operator, have enabled us to produce a suitable sterilizer for every dental requirement.

There is a Castle Sterilizer just suited to your needs.

Ask for our new folder, which describes the full line. It will be gladly mailed for the asking

*Castle Sterilizers Sold by Leading Dental Depots*

**Wilmot Castle Company**  
1156 University Avenue  
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Dr. West's Protector and Preserver placed over exposed pulps will **positively save them**. No devitalization or nerve canal

work. No experiment. Used by the manufacturer in an active practice of 25 years and still used daily with uniform success. Will do exactly as stated or money cheerfully refunded. Easy and painless to the patient; easy and profitable to the dentist. Price \$5.00. Direct or through your dealer. Literature on request.

**Dr. Walter O. West's**  
**PULP PROTECTOR AND PRESERVER**  
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## Linking Up With Lincrowns is a Sensible Procedure



Every day, these ready-made, guaranteed 22-kt. Gold Crowns are proving that they are literally "*Worth More than their Weight in Gold.*"

The LINCROWN takes the place of the Laboratory-made Crown in a way that delights the busy dentist.

No waiting for impression taking, or model making, or for the laboratory to make the crown. That method usually took two sittings, one to prepare the tooth, one to adjust the crown.

The LINCROWN way is simpler.

Just take wire measure of the prepared tooth, slip wire over small end of LINCROMETER and the graduation at which it stops indicates the proper LINCROWN. Just a little trimming and contouring, then you cement the LINCROWN on the tooth and send the patient home the same day.

The LINCROMETER is free to all LINCROWN users. LINCROWN BOOKLET is a complete chart of LINCROWN moulds.

LINCROWNS are guaranteed. If you are not absolutely satisfied, we prefer to return your money.

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When you start your day with a cup of steaming, fragrant coffee, you owe most of the pleasure derived from it to Brazil. If your breakfast table is a mahogany one, that may also have grown in Brazil at one time (as a tree, not as a table). And—oh yes, Brazil gives us Brazil nuts. Of course, this is not the slang version, because a "nut" wouldn't know enough to use

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This issue finishes the series of "Trips 'Round the World with 'Golddust.'" To those who have been so unfortunate as to miss the other eleven "trips" we repeat our reasons why you should use "Golddust" for your plate-making: Because it is exceptionally strong, plates made with it are absolutely non-porous, and it is both easily manipulated and vulcanized. It is of low specific gravity, therefore economical to use, and with the minimum of effort you can give it that beautifully lustrous high polish which shows the admixture of finely pulverized aluminum with the rubber.

Send the coupon before the year "goes out."

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\$5.25 per pound. \$2.63 per half pound. 1/6th pound sample box (about 5 sheets) \$1.00

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239-243 Fourth Ave., Dept. DC-12

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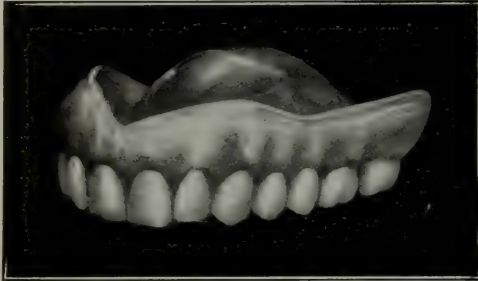
\$1.00 for

Sample box  
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Dr. ....

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The Highest Type of Plate Dentures



FOR years we have made a special feature of this line of work. Send model same as for Gold Plates.

Careful attention given to Continuous Gum Plate repairs.

Porcelain Gum baked on teeth single or in sets for restoration.

Porcelain Gum Body, \$1.50 per box  
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## NATURAL SKULLS

with 28 to 32 Teeth, Natural, Clean and good Occlusion, showing pyorrhea conditions or third molar or without either one.

Prices vary according to specimens, \$50.00 up.

Disarticulated skull showing sinus of both antrum, mastoid and frontal sinus as well as dismantling the whole skull.—\$50.00 and \$60.00.

Will submit for approval 10 days, C. O. D.

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Insist on Seeing our Name and Trade Mark

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Quality  
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# THE ORIGINAL ZINC CHLORIDE ANTISEPTIC

EACH FLUID OUNCE  
CONTAINS ONE GRAIN OF  
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AN ACCURATE LIST  
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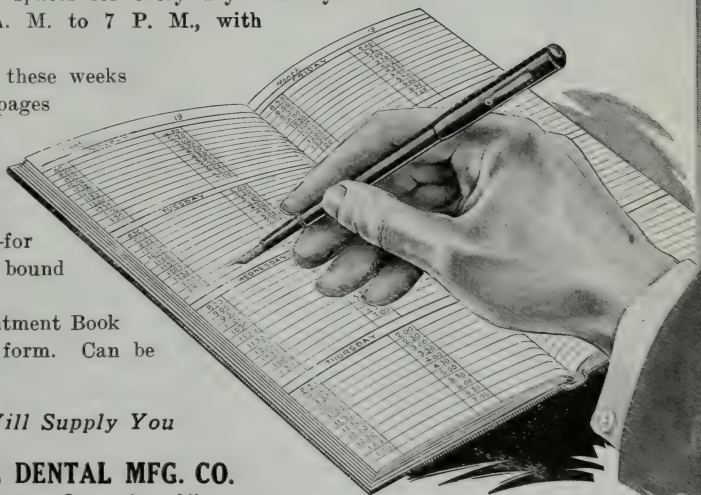
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We are paying exceptionally high prices for scrap gold, crowns, bridges, dental fillings and sweepings, amalgam, false teeth, with or without gold, grindings, platinum, and alloy scrap. Send your material to us as it is. We will do any necessary cleaning, classifying or assorting, and send you spot cash by return mail. Your goods returned within ten days if you are not satisfied. Try us today. It will pay you handsomely.

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Dr. A. C.  
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White  
Alloy

*For Twenty Years the Favorite*

This excellent alloy combines superior edge strength, non-shrinking and non-expansion properties with fine color and good working qualities. There can be nothing BETTER—regardless of PRICE.

ONCE TRIED—ALWAYS USED

Per single oz., \$2.25; five-oz. bottle, \$10.50

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has become well known and  
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In Pressure Anesthesia.

For the Painless Extirpation  
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traction.

In treating Sensitive Dentine,  
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*Neurocaine being always ready  
for use, the busy Dentist will  
find it a great time saver,  
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TIME IS MONEY.*

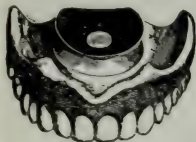
One Dollar per bottle  
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May be ordered through Dental  
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What are you paying  
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Your 1920 dollar is  
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Universally used—eas-  
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Upper or Lower \$2.00 per box—Half Doz.

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offers an opportunity to men and women to rise in a short time from positions having no future to a lucrative, uncrowded profession: the art of making every kind of artificial denture. Previous experience is unnecessary; instruction is individual; no classes or book-study. Equipment is up to date, course modern, methods practical. School open all year; hours of study arranged to suit individual convenience. McCARRIE trained men operate successful laboratories throughout the country. Complete information in Catalog No. 15, sent upon request.

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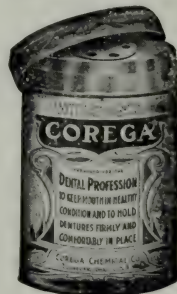
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## Dental Plate Comfort Powder

Sprinkled Lightly on Dental Plate

**Holds False Teeth Firmly in Place**

*Prevents Irritation and Sore Gums*



Use  
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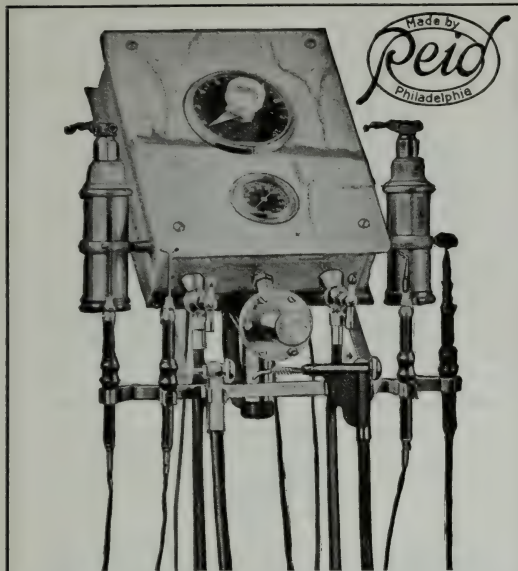
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Corega used on cotton rolls keeps  
them from slipping out of place,  
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of rubber dam.

Pleasing Healthful Sanitary Antiseptic  
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**Corega Chemical Company**

Cleveland, Ohio



The Equipment of a Dentist's Office is Very Frequently  
an Index to His Ability

The high-grade work you are able to accomplish with the **REID Electro-Pneumatic Distributing Unit**, together with its handsome appearance, cannot help but create that favorable impression which is so necessary. Circular on request. Supplied through your regular dealer.

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for either alternating or direct current, with one polishing and one buffing attachment and variable speed at



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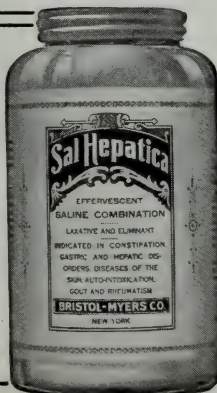
No dentist can afford to be without it. We make larger motors also. Write for particulars.

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Materially  
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*Conform to 90% of  
All Lower Denture  
Cases*

Following exactly the contour of the jaw, Williams Ready-made Lingual Bars will conform to 90% of all lower denture cases and with very little manipulation can be made to fit any case. Curving where they fit the anterior portion, they do not impinge on the muscles under the tongue.

Williams Bars are heavier because they contain more gold. They possess greater strength and rigidity. The ends are so strong that they may be bent without breaking them.

Gold—Platinum and gold cased Bars in three convenient gauges of wire.

Be sure you get Williams when ordering Lingual Bars; they were the first made; they are the best.

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Instruments and appliances will be made in  
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Watch for demonstrations at  
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We recut old burs equal to new at \$2.75 per gross, 25c a dozen. Facers, reamers, and finishing burs resharpened at 10c each.

Samples of 6 burs resharpened free

Mail orders promptly attended to

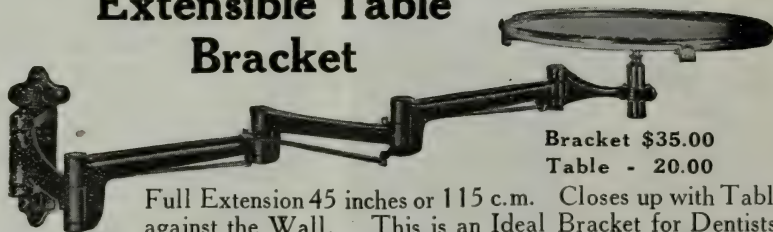
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Established 1907

## Extensible Table Bracket

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&  
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Bracket \$35.00

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Full Extension 45 inches or 115 c.m. Closes up with Table against the Wall. This is an Ideal Bracket for Dentists.

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**SAVES 95% OF EXPOSED PULPS**

Charge a fee for saving pulps rather than for removing them.

You can save over 100 pulps with this package.

Price ..... \$5.00

If after 60 days' trial you would practice dentistry without it return unused portion for full credit.

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**You should buy only one Dental  
X-Ray Outfit in a lifetime and  
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**SEE**

EDWARDS Coolidge Dental X-ray Unit.

EDWARDS Mobile Tube Holder (at your finger tips).

EDWARDS Gravity Time Switch.

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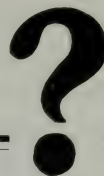
EDWARDS Cathode Protection.

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### BS POLISHERS

DO YOU want the best goods so you can render the best service to your Patients?

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DO YOU want to employ methods that will produce as little pain as possible?

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### BS POLISHERS

DO YOU want to polish the necks and roots of the teeth without cutting or tearing the gums?

Then use



**BS**  
**POLISHERS**  
PAT. AUG. 27, 1918



They clean but do **not** injure the teeth; cut or tear the gums.

Use your **Favorite** polishing materials. If made into a paste and put inside the cup they will always be right where you want them.

**Price, 60c per doz.; \$6.70 per gross**

Young's Mandrels are made for these Polishers and are not intended for other uses. R. A. Mandrels are made short as possible, which enables the operator to reach the buccal surfaces of the molars.



For No. 7 Handpiece  
Price, 5c each

For No. 2 R. A. with  
protecting cap, 15c each

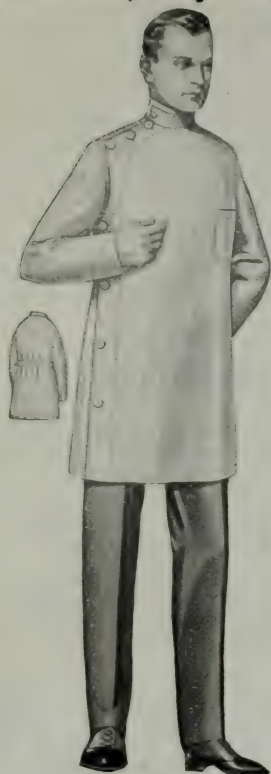


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The reliable dealers sell them  
MADE EXCLUSIVELY BY

**YOUNG DENTAL MFG. CO.**  
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From White Banno Cloth. A close-woven Mercerized Twill—(Our Fabric .04).

\$5.50 each or 3 for \$15.00

Also Durco Cloth—White, Tan, or Grey.

\$4.50 each or 3 for \$12.00

Order by Size (34 to 46)

NOWESCO GARMENTS are the recognized standard for high-class professional apparel—cost no more than the ordinary and are

**EVER SATISFYING**

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Extraction Aprons  
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Simplifies the pulp extraction problem, Safely and Surely, Quickly and Painlessly. Will stop the toothache. Get a surprise for yourself and patients. Start them talking. Use a treatment the action of which is limited if your patients can't get back the day they are supposed to. No bad effects if directions are followed.

Order a jar today from your dealer or direct. Try it thirty days, and if not just what you are looking for, return the unused portion for full credit.

Narcotic Order not necessary.

**\$2.00 per jar**

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5-lb. tins, White or Gray, Artificial Stone .....	\$1.50
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*For sale by your Dental Depot or direct on receipt of check*

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**Wanted.** Wide-awake dental salesman, dental agents and dental depots to sell our wide-awake dental specialties. Liberal commissions. Send for our catalogue. DENTAL CHEMICAL CO., Roslyn, Montgomery County, Pa. Established 1896.

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**For Sale.** Well-equipped dental office and exceptionally good practice in a fast-growing town in Northern Louisiana. Nearest dentist fifteen miles away. Near noted oil fields. Going CHEAP. Address "H. J.," care DENTAL COSMOS.

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**Position Wanted.** In ethical office. Harvard graduate of seven years' experience. Good operator; expert exodontist. New England, especially Massachusetts, preferred. Best of references. State offer in first letter. Address "H. C. M.," care DENTAL COSMOS.

**Position Wanted.** Experienced woman practitioner seeks position with ethical dentist. Licensed dental surgeon in Great Britain. Completed post graduate course in crown and bridge work at University of Pennsylvania. Registered in Pennsylvania. Thirteen years' experience. Wishes position in or near Philadelphia. Address "M. J.," care DENTAL COSMOS.

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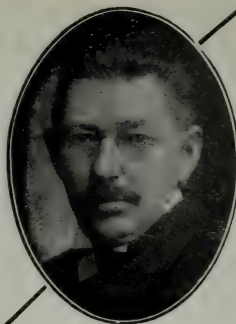
**Dentist Wanted.** Registered or able to register in Iowa. Take charge of a live, modern dental office in county seat town, or will sell now or later. Give terms. Office do \$7000 to \$8000 year. Well established. Address "2631," care F. V. KNIEST, Peters Trust Building, Omaha, Nebraska.

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**Special Attention.** If you have a practice for sale, or seek a location or position for a dentist, physician, veterinarian, or nurse, write to me. I also negotiate purchase and sale of drug stores and locate drug-store operatives in any capacity. Assts., nurses, etc., furnished dentists. Address F. V. KNIEST, R. P., "Bee" Building, Omaha, Nebraska.

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The Baltimore College of Dental Surgery, the first and for many years the only dental school, offers facilities for the study of dentistry proper, such as age and experience only can give. Its immense museum, complete apparatus, large and well-arranged building and carefully studied curriculum, give to its students great advantages and opportunities, both theoretical and practical, while its age gives its diploma a dignity far outranking all other colleges,—a diploma honorably represented in all civilized countries, and held by the most distinguished members of the dental profession.

The fact that dentistry must be practically taught is fully recognized, the College Infirmary, a most complete, large and handsome hall, being daily filled with clean and respectable patients, of class nearly equal to those of the average dentist. The Infirmary is open

all the year. For Summer Session, no charge to those who attend the following Winter Session.

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**FEES.**—Matriculation (paid once only), \$5.00. Tuition fee, \$175.00. Diploma fee, \$30.00. Dissecting fee (paid once only), \$10.00.

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Matriculation will close August 1st, instead of ten days after the opening of the fall session as heretofore.

For catalog address

**Dr. Daniel H. Squire, 25 Goodrich St., Buffalo, N. Y.**

# University of Maryland

## DENTAL DEPARTMENT

**T**HE regular Winter Session commences on October 1st of each year and ends in the following May.

The Annual Catalogue contains Courses of Study, etc. Attendance upon four regular winter sessions will be required before the final examination for the Degree of Doctor of Dental Surgery. Any candidate who may fail to pass the final examinations in April will have the privilege of a second examination in the following October without further attendance at a regular session. Graduates of medicine and those who have attended a recognized dental school for one or more sessions are admitted to higher grades on entering this school. The requirements for admission are the same as in all reputable dental colleges and according to the rules of the National Association of Dental Faculties.

**FEES.**—Matriculation fee (paid once only), \$5; Tuition fee, \$150; Diploma fee, \$30; Dissecting fee (paid once only), \$10.

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*For Particulars apply to the Dean*

## New York College of Dentistry

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## North Pacific College

Dentistry and Pharmacy

Portland, Oregon

The Annual Session Begins October 1st

### Requirements for Admission

Graduation from an accredited high school or academy, or an equivalent education, fifteen units, thirty credits. No conditions on the foregoing entrance requirements are allowed.

### Course of Instruction

The course in Dentistry is four years.  
The courses in Pharmacy are two and three years.  
The length of the annual session is eight months.

### Recommendations for Prospective Students

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THE REGISTRAR

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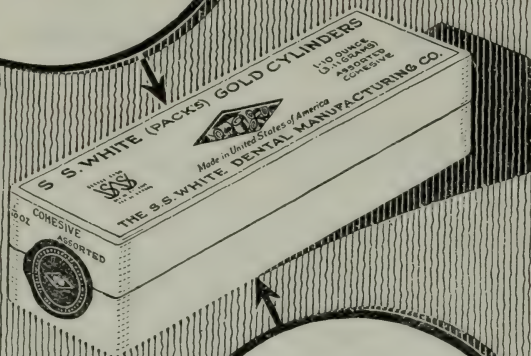
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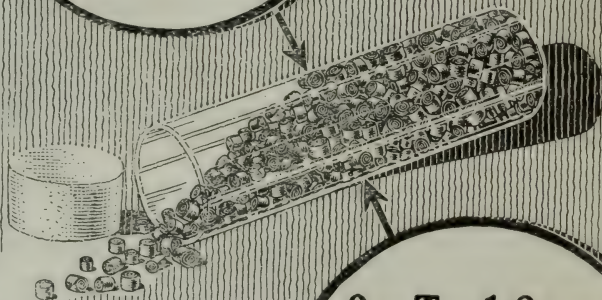
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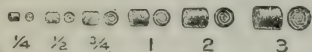
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